1964

ALASKA DEPARTMENT OF FISH & GAME

COMMERCIAL FISHERIES DIVISION

BRISTOL BAY AREA

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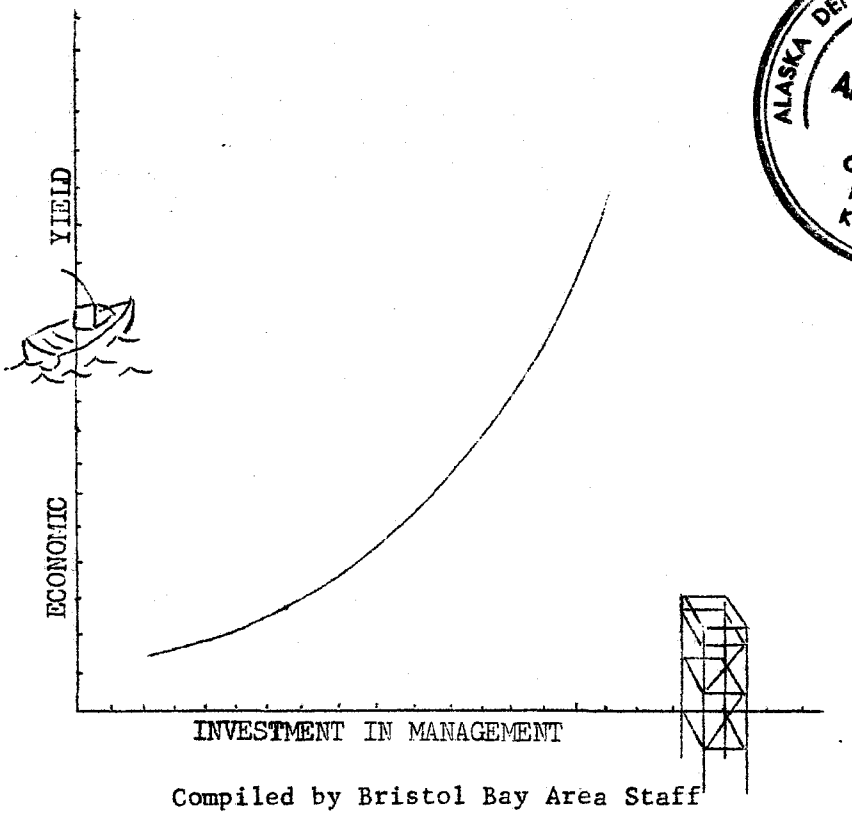
ANNUAL MANAGEMENT REPORT
1964



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PREFACE

The 1964 Management Report represents the most ambitious effort to date by the Bristol Bay Area staff to compile a comprehensive report of the Commercial Fisheries Division activities. The extensive tables represent an effort to up-date past information and record material previously unlisted that may be useful and informative.

This 1964 report emphasizes a descriptive account of commercial fisheries management procedures and objectives plus a brief account on the several field programs which relate directly and indirectly to management of the fishery resources.

It is our intent that this effort will assist in realizing a basic objective of this report, to create a better understanding of the commercial fishing management program in Bristol Bay.

Differences in catch figures between the text and some tables is a result of most of the report preparation having been completed before final figures were available. A final catch table (Table 10) is inserted for specific reference. All preliminary data is indicated as such.

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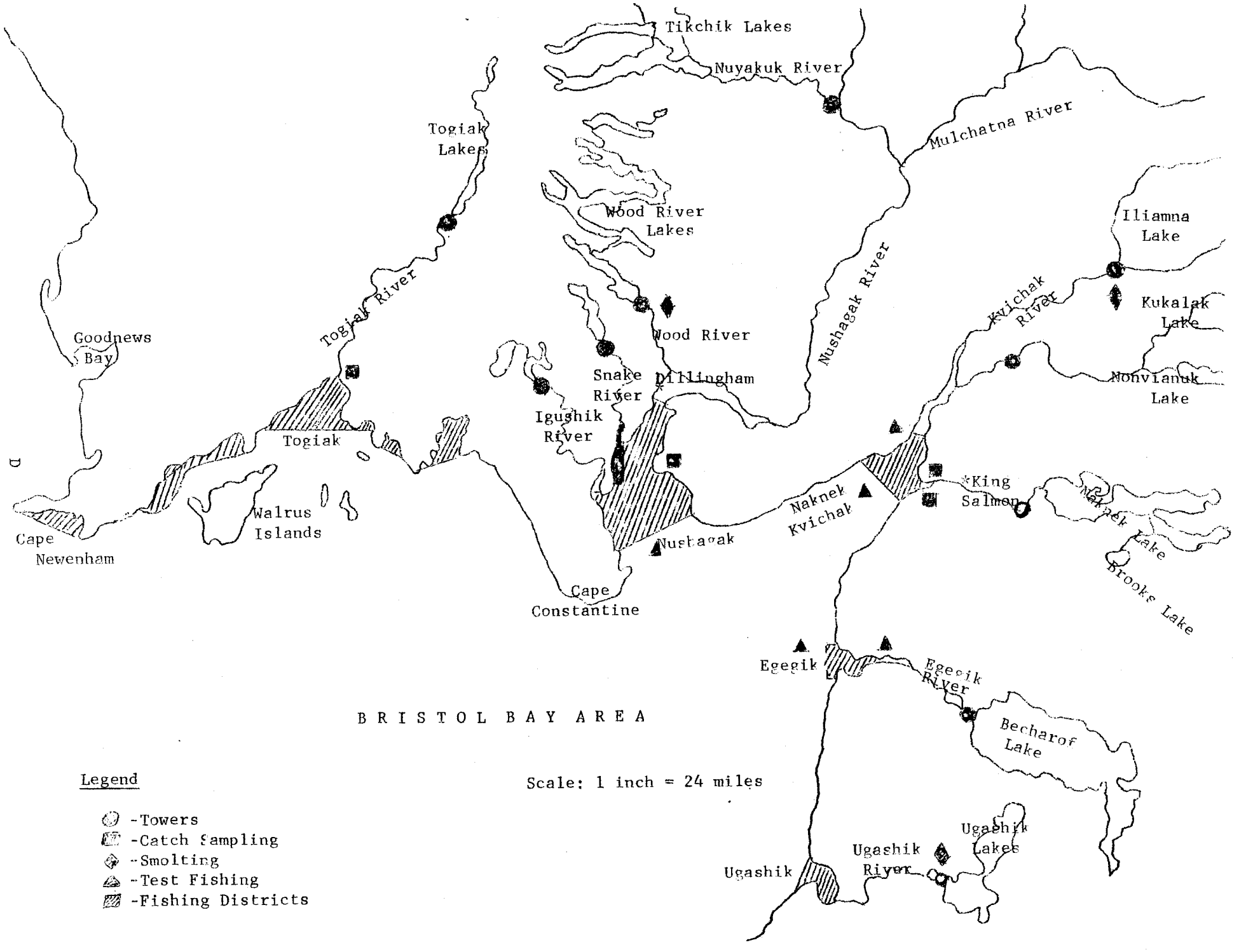
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Scale: 1 inch = 24 miles

BRISTOL BAY AREA MANAGEMENT REPORT

-1964-

INTRODUCTION

The 1964 Bristol Bay red salmon run, as did the 1963 run, fell far short of the prediction. The total return of 10.9 million red salmon was only 61% of the 17.8 million predicted. The low return of 1.7 million to the Kvichak system, compared to the expected 8.3 million, accounted for the difference. All other system returns were remarkably close to predicted values.

Escapements within or close to desired ranges were realized in all major systems with the exception of the Ugashik district and the Kvichak River. Overall, the final escapement of 5.32 million red salmon closely matched the catch of 5.6 million.

Fishing effort in Bristol Bay continued to increase, reaching a new high since statehood. Vessel registration increased 1.5% over 1963, and gill net registration was up 9.2%. The resident gill net registration increased by 3.1% and the non-resident by 24.9%. Total gill net registration has increased 89% since 1960.

This year there were 11 shore canneries and one floating cannery in operation. Four reefer ships froze salmon and there were six companies or individuals mild-curing salmon.

The 1964 case pack value totalled approximately 17.5 million dollars for all species, based upon first wholesale value. Estimated direct income to the State from case pack taxes and fishing licenses was $638,000. The 1964-65 fiscal year Commercial Fisheries Division operating budget for the Bristol Bay Area is $175,000.

During 1964 a total of 50 seasonal employees were engaged in conducting 11 separate field programs at 20 different stations to collect information essential to the immediate and future management and research of the fishery resources.

Test fishing, now an integral part of the management program, was expanded in 1964 to include a test fishing vessel in the Nushagak district and another vessel to test fish in the outer zone of the Egegik district. Initiated in 1960 in the Naknek-Kvichak district, test fishing is now conducted in 4 of the 5 fishing districts, the exception being the Togiak district. Test fishing has contributed significantly to more precise management regulation during the brief, intense red salmon fishery. The annual migration of Bristol Bay red salmon through the five fishing districts is essentially completed within a three-week period. The increasing efficiency of the fishing fleet plus the continuous upward climb of gear registration, imposes critical demands upon proper evaluation of the strength and size of the salmon run at any given time.

The policy of field announcement regulation during the red salmon run continues to provide the necessary flexibility for effective management. This day-by-day adjustment of fishing periods, whereby the open and closed periods are determined by analysis of catch, escapement and test fishing information is the vital key to securing escapement goals and realizing an economic harvest of fish surplus to escapement requirements.

Other than the innovation of test fishing, little progress has been made in exploring and developing new management techniques since assumption of the management responsibilities in 1960, other than a concerted effort to keep "on top of the fishery." After five years of extreme effort to

maintain the basic management functions, the point has been reached where a thorough evaluation of field programs is needed. Many techniques inherited or adopted by management were still in the experimental stage, many areas of investigation have not been attempted or followed through. Experience has now clearly demonstrated the obvious need for many improvements. The ability of the Department to explore and improve fisheries management methods and follow them through is paramount to continued and improved salmon production in Bristol Bay.

The emphasis upon red salmon has overshadowed the importance and value of the other four species of Pacific salmon in Bristol Bay. While red salmon are by far the most important and valuable to the salmon industry, the other species are significant to the individual fishermen, particularly in years when the red salmon runs are low. The total salmon catch of 7.8 million, for all species in 1964, was composed of 70% reds, 18% pinks, 10% chums, 1.7% kings and 0.6% silvers.

While final figures are not yet available for the take of Bristol Bay red salmon by the Japanese high seas fishery, it is recognized that their catch of these fish in 1964 was very low. Some estimates have placed this catch at about 600,000 fish. In addition to the normal early summer high seas fishery, the mothership fleet moved into the area just below the Aleutians in the fall for the first time and fished on immature red salmon. Official figures are not available at this time on the number of immature Bristol Bay reds taken by this effort, but some estimates have placed the catch around 1.7 million fish.

DISTRICT SUMMARIES

NAKNEK-KVICHAK DISTRICT

The Naknek-Kvichak fishing district covers approximately 200 square miles and is divided into two sections, the larger Kvichak section of some 165 square miles and the smaller Naknek section, covering about 35 square miles.

Generally, the entire district is either open or closed to fishing, but for the last two years, the Kvichak section has been closed for most of the red salmon season in an effort to obtain as much escapement as possible from the small runs. The existence of these two sections since 1962 has provided some measure of separate management control of the catch and escapement for the Kvichak and Naknek river systems. This was a necessary management tool in 1964. However, at the present level of fishing effort in the district, the concentration of gear resulting from closure of one or the other sections creates overcrowding, confusion, and decreased efficiency of the individual fisherman's efforts. The level of fishing gear creating these conditions also presents a public relations problem when it is necessary for management to utilize this management tool.

The west end of the outer Naknek-Kvichak boundary line was extended 6 miles in 1964, resulting in an increase of approximately 45 square miles in fishing area. There were no boundary changes made during the season.

The initial gear registration for the district was 883 gill nets, including both drift and set net gear, which was 4 units less than in 1963.

The district prediction of 12.5 million red salmon had 8.3 million assigned to the Kvichak River, 2.4 million to the Branch River and 1.8 million to the Naknek River. The actual district return was a low 4.8 million red salmon.

The poor showing of 4-year old, 2 ocean red salmon to the Kvichak system accounted for the difference between the predicted and actual return to Bristol Bay in 1964. While 80% of the Kvichak run were 4 year fish, this only amounted to about 1.4 million fish.

Some of these fish, which left the lakes in the spring of 1962 as 1-winter smolt, the first of the 1960 parent year spawning, will return in 1965 as 5-year, 3-ocean adults. However, these fish are expected to be only a minor part of the 1965 Kvichak run, which will consist mainly of fish from the 1960 parent year that did not leave the lakes until 1963 as 2-winter smolt, and will return in 1965 as 5 year, 2-ocean adults.

The results of the 1964 season indicate the 4-year cycle has disappeared as suddenly as it appeared in 1952, and that the dominant Kvichak run has reverted to its historic 5-year cycle.

Two fishing periods of 24 hours each were allowed during the week of June 22-26, the first week of field announcement regulations. The total catch was only 110,000 reds. The next fishing period commenced on June 29, for 24 hours, and produced a low catch of 248,000 reds. Another 24 hour open period on July 2-3 produced an equally low catch of 236,000 and created concern as the normal peak of the run should have been building up by this time. However, some optimism for a late run was felt since fish were appearing notably late in other districts of the Bay as well as along the north side of the Alaska Peninsula.

Test fishing efforts were intesified in areas known for fish concentration. It became evident that fish were not in abundance in the upper Kvichak Bay area, or any distance offshore, but good catches indicated a volume of fish close to shore between Johnston Hill and Franks Creek.

between the lower Naknek-Kvichak and upper Egegik boundary lines. The question then was their final destination.

The Naknek River escapement began to rapidly build up on July 5. A 12-hour opening for the Naknek section only on July 6 resulted in a ctach of 541,000 reds. This same day the Naknek River escapement count was 543,000, putting the total escapement up to 900,000. In an effort to harvest the balance of the Naknek run, now that the escapement goal was assured, the entire district was opened for a 12-hour period on July 7-8. The resultant catch of 737,000 fish confirmed the lack of a substantial Kvichak run. Therefore, the Kvichak section was closed for the remainder of the red salmon season, while the Naknek section remained open to almost continuous fishing to allow harvest of the fish in excess of escapement requirements.

The Branch River system, tributary to the Kvichak River, and like the Kvichak, fell far short of its predicted run. The estimated total return to the Branch River was 500,000 red salmon.

Management techniques on the important Kvichak system revolve around three basic methods: (1) test fishing: sampling of fish both outside the fishing district as well as within the district during periods closed to commercial fishing. In addition, a test boat is operated at the mouth of the Kvichak River to provide an early estimate of the escapement; (2) aerial surveys are conducted over the Kvichak River as a further check on the escapement prior to arrival of the fish at counting towers; (3) catch analysis: catch records of each fishing period are compared to previous years for an indication of the strength and timing of the run.

In addition to these techniques, age composition of the run is analyzed during the fishery as a further indicator of the status of the run.

In other words, scale samples taken from the fishery as well as the escapement are rapidly processed and read, and these samples give some idea whether the run is developing as predicted on the basis of age groups and their representation in the fishery compared to the prediction.

Extensive salmon tagging is conducted on the high seas. Most of this tagging work is done on immature salmon for research on the high seas distribution of salmon. However, in previous years, some tagging was done just south of the Aleutian passes on adult, migrating red salmon bound for Bristol Bay. The recovery of these tags during the fishery provided another check on the red salmon runs. By comparing the recovery of tags with the catch, it was possible to determine with some accuracy whether the run was building up to the peak, at the peak, or past the peak. The tagging of migrating Bristol Bay adults was discontinued in 1963.

Adult migrating red salmon move through the Naknek River rapidly. Therefore, the Naknek system escapement can be regulated fairly effectively on the basis of the tower counts just below the lake outlet. Set net catches at the mouth of the river give some measure of the magnitude of the run entering the river. One further check point is the U. S. Bureau of Commercial Fisheries sampling station located downriver from the counting towers. The daily seining at this location for the purpose of collecting scales and measurements, serves as a further indicator of the magnitude of the escapement prior to the time actual counts are made at the towers. Aerial observations usually are not satisfactory on the Naknek River, except under ideal weather conditions. Escapements into the Naknek River have been within the desired range for four out of the last five years.

Catch

The total catch of all salmon species for the Naknek-Kvichak district in 1964 of 2.5 million fish was one of the smaller catches in recent years, approximating the 1962 season. The average catch for all species over the last 14 years is 4.2 million. The Naknek-Kvichak district catch accounted for 32% of the total Bristol Bay harvest in 1964 (Table 16).

Red Salmon The red salmon catch of 2.3 million contributed 41% of the total district harvest and was somewhat below the 14-year average of 62%. The 1964 red salmon catch for the district was only 55% of the 14-year average of 4.0 million reds.

The age composition for Kvichak reds, catch and escapement combined, was 73% 4-year, 2-ocean fish and 11.5% for 5-year, 2-ocean fish. The remaining few were equally divided between 4-year, 1-ocean and 5-year, 3-ocean fish.

The Branch River system age groups differed considerably with only 19% 4-year, 2-ocean and 22% 5-year, 2-ocean fish. The majority of the return (47%) were 5-year, 3-ocean fish, and 9% were 6-year, 3-ocean fish.

The Naknek system, similar to the Kvichak, had a substantial part of the run as 4-year, 2-ocean fish, 53%. However, the Naknek run differed in the other age groups present with 28% as 5-year, 2-ocean, 13% as 5-year, 3-ocean and 6% as 6-year, 3-ocean fish.

Chum Salmon Chum salmon is the only other species of salmon which is of any commercial significance in this district. The 1964 catch of 152,000 was slightly above the 14-year average of 135,000. The chums run slightly earlier and concurrent with the reds and are intermixed in the fishery.

The chum salmon are not managed separately, and their production appears to be relatively stable. Catch variation is probably influenced considerably by the fishing effort and strength of the red salmon run.

King Salmon The king salmon runs of this district are minor and restricted to the Branch and Naknek rivers. Most kings are caught incidentally to the red salmon fishery, though they do enter the fishery prior to the main red salmon run.

The 1964 commercial catch of 12,000 was slightly higher than the 14-year average of nearly 10,000.

Pink Salmon The pink salmon run is also very minor in this district. These fish enter the fishery toward the end of the red salmon run.

The 1964 catch of 42,000 was the highest recorded catch in recent years.

Coho Salmon Coho, or silver salmon are the least numerous of the five salmon species in this district, and are the latest to enter the fishery. Usual arrival is in early August, after the main canneries have ceased operating. Consequently, very little commercial fishing pressure is exerted upon this species.

Escapement

Red Salmon Counting towers are maintained on the Kvichak, Branch and Naknek rivers for the purpose of enumerating the red salmon escapement into these systems. In addition to counting the fish as they enter the lakes, the tower crews also seine fish daily to obtain length measurements and weights, sex ratios, collect scales which are read to determine the age composition of the escapement and record gill net and predator marks.

The prospect of a 12.5 million return plus the three-day delay of the main body of the run precluded complete protection for the low Kvichak return. However, test fishing efforts and restrictive fishing enabled the realization of a 957,000 escapement from a total return of 1.7 million red salmon.

The Branch River escapement cannot be regulated separately from the Kvichak and is normally proportional to the Kvichak escapement, averaging about 6% of the Kvichak escapement. The 1964 escapement of 249,000 reds was 48% of the total return to this river system.

Only cursory aerial surveys are made in the Kvichak and Naknek systems because the Fisheries Research Institute and the U. S. Bureau of Commercial Fisheries conduct extensive surveys in the course of their lake system research studies in these areas. The Department does conduct aerial surveys to determine spawning ground distribution and utilization in the Branch River system.

The Naknek system escapement tends to peak between July 5-8, especially in the last three years. This year 40% of the escapement passed the counting tower in one day, on July 6, and 67% of the escapement passed in three days. Because of the rapid entry of fish into the river, the escapement of 1.4 million slightly exceeded the upper end of the desired escapement range.

The total red salmon return to the Naknek system of 2.5 million exceeded the prediction by nearly 790,000 fish.

The sex ratios of the escapement are of interest since this has an important bearing upon the potential egg deposition, hence the theoretical yield from a given spawning population. The Kvichak escapement

consisted of 42% females and 58% males. The higher percentage of males is due in part to the presence of 4-year, 2-ocean fish plus a showing of 3-year, 1-ocean "jacks" which are practically all males. The Branch River escapement was 62% females and 38% males. The Naknek River system received 58% females and 42% males.

EGEGIK DISTRICT

The 1964 regulations allowed an increase in the Egegik district equivalent to about one-third the 1963 area. Extensions were made on both the outer and inner boundaries with the bulk of the new area extending 4 miles south of Goose Point to Abalama Creek, then 3 miles offshore and north to a point 3 miles offshore from Franks Creek (Big Creek). Accordingly, the gear registration increased 33% over 1963. The actual licensed gear both drift and set gill nets was 535 units.

The return of 1.9 million red salmon to the Egegik district was higher than the 1.6 million prediction, but this degree of accuracy is excellent when one considers all of the possible variables in predicting a run of salmon to a particular system.

Generally, the Egegik district red salmon run is the first to enter the fishery in any numbers in Bristol Bay. This can be expected on July 3, but this year a minor peak occurred as early as June 25 and then the main peak did not occur until July 7.

This year the Department initiated a program to test fish the area outside of the fishing district during closed periods. In addition, the inside test boat continued to operate as in the past. This inside test boat is a continuous sampling of the escapement passing through the

fishing district. As with other inside test boats, the objective is to establish an index value based upon sample catches which will provide an estimate of the actual escapement as soon as the fish pass through the fishery.

The objectives of the outside test boat are: (1) to determine the presence or absence of fish outside the fishery; (2) provide some measure of the magnitude of fish migrating to the Egegik River; and (3) provide scale samples in areas of possible intermixture between Naknek-Kvichak and Egegik stocks in an attempt to define these areas and the possible degree of intermixture. This outside test boat provided very helpful information in conjunction with the outside Naknek-Kvichak district test boat in locating and defining the presence and extent of the main body of the Naknek and Egegik river runs this year.

Egegik system reds characteristically pass through the short fishing district very rapidly. Aerial observations cannot be made in the river due to murky water. These factors further emphasize the importance of establishing a method to measure the strength and timing of fish entering the district. In addition to some of the management procedures described for the Naknek-Kvichak district, much of the Egegik district management is based upon continual aerial observations of the large, clear-water lagoon just below the counting towers and the lake outlet. While the salmon move rapidly through the river, they congregate for several days in the lagoon before proceeding upriver past the towers and through the rapids. Due to the shallow depth and clear water of the lagoon, accurate aerial observations are possible except in very windy or overcast weather. Comparing the pattern of fish concentrations in the upper and lower portions

of the lagoon, plus the daily buildup of incoming fish, gives a further indication of the probable numbers of fish still in the river between the lagoon and the upper boundary of the fishing district.

Because of the short district and limited time that the fish are available to the fishery, management in this district calls for more fishing periods of short duration. The fishery itself provides a definite indicator of the strength of a run, and in contrast to the larger Naknek-Kvichak and Nushagak districts, where the fish can and tend to build up in large numbers within the district, the Egegik fishery is less apt to harvest a large portion of the run in a given fishing period.

It is confusing to some people when comparing the tower counts during the season that some districts can be having so much fishing time while the tower counts may be as low or lower than other districts which may not be fishing for rather extensive periods. This difference is due to the fact that the escapement at some towers is counted within hours from the time the fish pass through the fishery, while in other districts the delay between fish passing through the fishing area and actually reaching a counting tower may be several days. Test fishing and aerial observations are the methods used by the management biologist to obtain escapement estimates during the fishery in those districts where the escapement may take several days to reach counting towers. Each fishing district has its own peculiarities and each is managed accordingly. This is the heart of commercial fisheries management in Bristol Bay; evaluating and judging the strength and timing of a particular run at any particular time. Many factors go into these decisions, and often the factors are not nearly as clear-cut as we would like them to be.

Catch

Red Salmon The red salmon catch of 1.1 million represents a maximum harvest out of the 1.9 million run, based upon the escapement goal of 850,000 for 1964.

As mentioned previously, a minor peak occurred on June 25 with a catch of 153,000. The main peak probably occurred between July 4-7 when a major portion of the escapement was obtained, and over one-half of the season catch was realized between July 6-10 in spaced fishing periods.

The age composition of the Egegik reds, catch and escapement combined was 51% 5-year, 3-ocean; 22% 4-year, 2-ocean; 15% 6-year, 3-ocean and 3% 7-year, 3-ocean fish.

Chum Salmon The chum salmon production appears to be fairly stable and the 1964 catch of 21,000 is near the average catch for the last 14 years (Table 13).

King Salmon King salmon are of minor importance in this district. The 3,400 catch in 1964 is slightly above the 14-year average of 2,900. Increased interest in king salmon has led to more effort recently on these species prior to the red salmon run.

Pink Salmon Pink salmon do not enter this district in commercial quantity.

Coho Salmon Coho or silver salmon are also minor in this district, and the little effort on this late run is mainly for salting. Since 1951 the catches have averaged 3,000 (Table 15).

Escapement

Red Salmon Two counting towers are maintained on the Egegik River a short distance below the outlet of Becharof Lake to enumerate the red salmon escapement. Due to the delay of the migrating fish which hold in the lagoon

below the towers, the tower counts cannot be used for management regulation during the fishery.

The pattern of fish movement out of the lagoon and past the towers is not consistent. This may be dependent upon the numbers of fish entering the escapement and congregating in the lagoon. This year, the pattern was rather uniform, with a steady buildup in numbers passing the tower until the peak days of July 11, 12 and 13 when 53% of the total escapement passed the towers.

Aerial surveys of the Egegik system are conducted in early fall to obtain the distribution of fish on the spawning grounds. Practically all spawning is limited to the eastern one-eighth of the lake, particularly in the area below Severson Peninsula.

The escapement into the Egegik system was within 424 fish of the management goal of 850,000. The escapements for the past six years have been in the desired range with 1960 being somewhat higher. The 13-year average total return to the Egegik system has been 1.8 million reds with an average catch of 1 million and an average escapement of 788,000. The largest return during this period was the 3.4 million run of 1961.

UGASHIK DISTRICT

The Ugashik district is the smallest in area of the five fishing districts in Brstiol Bay, covering approximately 40 square miles.

The only change in boundaries for 1964 was a slight adjustment of the inner line to place it 500 yards off the point of the King Salmon River. No boundary changes were made during the season by emergency order.

Gear registration increased 23% over 1963 with a total of 272 licensed units, including both dirft and set gill nets.

The total red salmon return of slightly over 1 million was very close to the 900,000 predicted. This is the largest return to the system in the last ten years except for the record run of 3 million in 1960 (Table 39).

Except for the Togiak district there presently are fewer means to gauge or measure the escapement during the fishery in the Ugashik than in any of the other fishing districts. A test fishing boat is operated in the river at the inner boundary line in an attempt to provide some means of measuring the escapement as it passes through the fishery. The results are encouraging, but it will take several years to fully evaluate test fishing as a management tool in this system. Each successive year of operation helps to further determine the reliability or unreliability of the sample catches as an index of the actual escapement at the test fishing site.

The silty Ugashik River prevents aerial observations of the escapement in the river. While there is a shallow, clear-water lagoon just below the counting towers at the lake outlet as in the Egegik system, the salmon in the Ugashik district generally delay in the river from one to two weeks before entering the lagoon. They also tend to move through the lagoon and on past the towers very quickly after leaving the river. This pattern of fish movement makes management of the Ugashik district quite difficult.

If the prediction indicates a good return to the system, the technique of numerous, short open periods to evaluate catch success as a measure of the strength of the run becomes an essential part of the management of this district.

An outside test fishing boat has not been tried in the Ugashik district. The smaller salmon runs make the problem of sampling incoming fish somewhat less critical here than in other districts where the test fishing technique is being developed. The later timing of this run also helps, usually allowing for attention to be shifted to this fishery.

The 14-year average return to the Ugashik system has been 980,000 red salmon. The catch for this period has averaged 448,000 and the escapement 532,000 reds.

Catch

Red Salmon The 1964 catch of 577,000 red salmon is the highest catch over the last ten years, except for the 1960 season. This is also above the 14-year average catch for this district (Table 11).

Table 6 lists the catch by fishing period and shows that the run was rather steady with the best catch of 131,000 fish being made on July 10 during a 15 hour open period.

The two main age groups in the 1964 return, catch and escapement combined were; 4-year, 2-ocean (56%) and 5-year, 2-ocean (30%). Eight percent of the run were 6-year, 3-ocean fish, and 5% were 5-year, 3-ocean fish.

Chum Salmon The Ugashik system chum salmon catches have been at a rather stable level over the past 14 years (Table 13). While the red salmon production is at a lower level than in the Egegik district, the chum salmon catches are comparable.

King Salmon King salmon are very minor here as in the Egegik district. The 1964 catch of 3,300 is one of the larger catches for the district

(Table 12) and reflects a general growing interest in the early season harvest of this species.

Pink Salmon — Pink salmon do not enter this district in commercial quantity.

Coho Salmon — Coho salmon are not important in this fishery with a 14-year average catch of only 3,900.

Escapement

Two counting towers are maintained at the outlet of Lower Ugashik Lake to obtain a total count of the red salmon escapement.

The final escapement of nearly 473,000 fell short of the 600,000 goal, but was considered good in view of the total run size plus the difficulty of managing this district. This was the largest escapement in the past 11 years, except for the record escapement of 2.3 million in 1960.

Escapement levels have been below the desired range of 600,000 - 1,000,000 in the last four years. However, the total returns have only averaged 722,000 during this same period.

The Department conducts aerial surveys in the Ugashik system to obtain the distribution pattern of spawners in the available spawning areas.

NUSHAGAK DISTRICT

The Nushagak district covers approximately 400 square miles, excluding the extended area for king salmon fishing, and is comprised of three sections; the Nushagak, Igushik and Snake River. The Snake River

section has been closed to fishing during the red salmon run since 1961 in an effort to protect and rehabilitate the small stock of salmon in the system.

There were no fishing district boundary changes for 1964, and no boundary changes were made by emergency order during the fishing season.

The initial gear registration for the district was 786 units, drift and set gill nets combined, which was 15 units higher than the effort in 1963.

The return of 2.7 million red salmon was close to the 2.4 million prediction. The prediction had 1.4 million assigned to the Wood River system, 935,000 to the Igushik, 10,000 to the Snake, 10,000 to Nushagak-Mulchatna River systems and 116,000 for the Tikchik Lakes.

Normally, the Nushagak red salmon run peaks during the first week of July, but this year two distinct peaks occurred. The first run was intercepted by the fishery when a catch of 612,000 was made during a 24 hour fishing period on July 2. Seven consecutive closed days were necessary to allow escapement of the second main run which was detected by test fishing efforts on July 7. Test fishing indicated this body of fish was located along the east shoreline between Clarks Point and Nushagak Bluff, and centered in the vicinity of the Ekuk cannery. On the evening tide of July 9 the fish began moving into the three river systems. Approximately 68% of the 1.1 million Wood River escapement was realized from this second run.

Management in the Nushagak district included the use of an outside test boat for the first time in 1964. Much of the test fishing was exploratory in nature, trying to determine the main channels of migration

into the fishing district. The success of locating the presence and timing of the second run within the district was in large part responsible for achieving the Wood River escapement goal. Other management techniques used in this district, particularly for the Wood River system are aerial surveys to estimate escapement in the river prior to reaching the towers and catch analysis. The fish generally move through the Wood River fast enough to make the tower counts useful as a management tool.

Catch

The Nushagak district realized its largest total salmon harvest in 20 years. The 1964 catch of 3.3 million is the highest since 1944 when 3.5 million salmon were caught. This harvest was the largest of the five districts in Bristol Bay, contributing 43% of the total salmon taken in the Bay.

Red Salmon The 1964 red salmon catch of 1.4 million compares favorably with the high years since 1950 and is 38% above the average catch of 1 million for these years.

Age composition of the commercial catch in the Nushagak district was composed of 52% 4-year 2-ocean fish. Five-year-old fish, 3-ocean and 2-ocean, contributed 27 and 18 percent respectively to the total.

Chum Salmon A harvest of 443,000 chum salmon was the largest catch since 1960. The 1960 record chum salmon catch was 642,000. Although the Nushagak district chum salmon catches normally are less than 200,000, a few large catches raise the 14-year average to 221,000 (Table 13).

King Salmon The king salmon catch of 99,000 was the largest since 1929 when 108,000 kings were caught. The resultant catch was approximately twice the 72-year average (since 1893) of 53,000. Kings were taken continuously through the fishery until late summer.

Pink Salmon The 1964 harvest of 1.4 million pink salmon is the largest catch on record. The 1958 pink salmon total run of between 3.5 and 4 million surpassed this year's run by approximately 1-2 million (the 1964 run was estimated at 2.3 million). A liberal fishing season plus additional fishing effort accounted for the large catch. Sixty-nine percent of the catch were males, and 31% females as determined from catch sampling information.

Coho Salmon The coho salmon catch of 32,000 in 1964 is comparative with the 14-year average (Table 15). The 1958 catch of 127,000 is the highest ever recorded.

Escapement

Extensive surveys were made in the Nushagak district. Surveys were made by aircraft, boats and on foot. Escapement information was obtained on reds, kings, chums and pink salmon.

Red Salmon An escapement goal of 900,000 red salmon was set for the Wood River system from a predicted return of 1.4 million. An escapement of 1.1 million was obtained from an actual return of 2.2 million to the Wood River system.

For the past six years, the Wood River tower counts have peaked between July 3 and July 11. The 1964 escapement count was highest on July 11. The total red salmon escapement into the Wood River system was

1.1 million. Approximately 39% of the escapement were males, and 61% females.

The Igushik system received 10% of the district escapement. A prediction of 900,000 based upon good escapements in 1959 and 1960 (644,000 and 495,000 respectively) failed to materialize, and the escapement of 129,000 plus the catch put the total run at only 314,000 red salmon.

The protected Snake River system return of 26,000 was higher than the 10,000 expected return. The return was divided into a 12,000 escapement plus a calculated catch of 14,000. Both the Igushik and Snake River section catches are assigned on the basis of age composition differences in the escapements of all the Nushagak district systems. While the Snake River section is closed during the main red salmon season, fish bound for here are intermingled to an unknown degree in the Nushagak and Igushik fisheries. Consequently, some harvest of these fish occurs during the course of the fishery, despite the closure of the section.

The Nuyakuk River system, draining the Tikchik Lakes, was predicted to receive a return of 116,000 adult red salmon. The actual return of 240,000 was divided into an escapement of 103,000 and a catch of 137,000. The peak count at the counting station was on July 15 when 26% of the escapement passed the towers.

An estimated escapement of 11,000 red salmon was observed in the Nushagak-Mulchatna river systems, equaling the predicted 10,000 total return to this portion of the drainage.

Chum Salmon The chum salmon escapement was estimated by aerial observations at 11,000 with the largest numbers spawning in the Mulchatna

River system (tributary to the Nushagak River). Since this was the first year an attempt was made to enumerate these spawning fish, the 11,000 chum salmon observed is considered a sub-minimal number. Additional information to be collected in future years is peak spawning periods per river sections.

King Salmon A complete aerial survey was made of the Nushagak River system king salmon spawning area. In addition, float trips were conducted on two of the major spawning tributaries, the Stuyahok and King Salmon Rivers. The total observed spawning population was 18,000 king salmon.

On the basis of physical checks on the float trips, it was estimated that 60% of the escapement were males and 40% were females. Approximately 15% of the observed males were jacks.

While these estimates account for only a portion of the actual escapement, there is little doubt that tighter regulation of the king run is necessary to insure a better balance between catch and escapement to insure a sustained production.

Undoubtedly, the competition building with the increasing effort plus a series of below average seasons, will direct more fishing pressure on these earlier king runs.

Pink Salmon The even-year pink salmon run of the Nushagak district spawns mainly in the Nuyakuk River where they are counted as they pass the same counting station used for the red salmon escapement.

Pink salmon began passing the Nuyakuk River tower on July 15 and terminated their upriver ascent approximately August 11. The total escapement past the tower was 743,000. The total escapement estimate into the Nushagak River system including aerial counts on other streams was 909,000 pink salmon.

Sex composition of the escapement as determined from a 2,000 fish sample at the Nuyakuk River tower was 38% males and 62% females.

TOGIAK DISTRICT

The Togiak district is comprised of six sections; the Kulukak, Togiak, Ungalikthluk, Matogak, Osviak and Cape Pierce. The Togiak section is the main contributor of red salmon and sustains the bulk of the district fishery.

Since 1954, the first year of commercial fishing, 1.1 million red salmon have been harvested. The harvest of all five salmon species for this period totals 2.2 million.

Togiak Fisheries, the only operating cannery in the district, commenced operating in 1960. Red Salmon Cannery of Naknek, has been operating in the district since 1954, and hauls the fish to Naknek in brine scows for canning.

The fishery has been fairly stable although the effort has increased threefold since 1954. The people from the villages of Togiak and Goodnews are the main participants in the fishery.

Catch

The catches in the Togiak district fluctuate in predominance between reds and chums. Most of the catch emphasis is placed on the red salmon. King and coho salmon are sought for mild curing purposes.

Red Salmon A record catch of 251,000 red salmon was taken from a total return of 355,000. Catches built up to a high of 85,000 for the five-day period July 6 through July 11.

King Salmon The harvest of 11,000 kings represents the largest number taken since the beginning of the fishery in 1954.

Chum Salmon Chum salmon catches have predominated for 3 out of the 11 years of the fishery. The chum catch of 139,000 was 33% of the total salmon catch for the district.

Pink Salmon Pink Salmon do not enter the catch in any appreciable numbers. The catch for 1964 was 1,800.

Coho Salmon Effort has increased on the harvest of the late run of coho salmon. The 1964 fishing operations lasted until August 22 for the latest known season. The total catch of coho salmon was 5,000.

Escapement

The Togiak River system red salmon escapement has been enumerated by the use of counting towers since 1960. A lapse of approximately 7 to 10 days occurs from the time the fish enter the river until they pass the towers and are counted. The estimated distance from the river mouth to the towers is 75 miles.

Red Salmon An escapement goal of 130,000 was set for the Togiak district based on an estimated return of 260,000. From the 363,000 total red salmon return, 96,000 entered into the Togiak Lake system. The total (tower and aerial counts) escapement for the district was estimated at 104,000.

King Salmon During the course of conducting management aerial surveys in the Togiak drainage, a total of 3,000 spawning king salmon were observed. Spawning had reached its peak on July 23. The total spawning population was estimated at 5,000.

Chum Salmon The chum salmon spawning population in the Togiak district as determined from aerial counts was estimated as 79,000. Spawning had reached its peak on July 27. A total of 41,000 chums were estimated spawning in the Togiak section, 32,000 in the Osviak, Matogak, Cape Pierce sections and 6,000 in the Kulukak section.

Pink Salmon Pink salmon are thought to utilize only small portions of the district for spawning. A total of 2,000 were counted during aerial surveys in the Togiak section.

FIELD PROGRAMS

ESCAPEMENT ENUMERATION

Escapement counting stations are maintained on ten of the major river systems in Bristol Bay. These counting stations generally consist of two elevated platforms, one on each bank of the river. To aid in visual observation of the salmon as they migrate along the riverbank, painted wire panels are sometimes placed on the riverbottom at right angles to the shore. Whenever possible, these stations are located at the outlet of lakes to facilitate supplying the camps by aircraft. Also, water conditions generally are more stable near the outlets.

The visual counting is conducted on a 24-hour schedule with actual tallies made for 10 minutes out of the hour from each bank. These counts give a reliable total estimate of the escapement.

Prior to the 1950's, escapements were counted by means of a weir which blocked the entire river and allowed passage of fish through a confined opening. These weirs were very costly to install each

season and required large crews to maintain them. Weirs could not be installed in all rivers. The development of the counting tower method in a five year research program by the Fisheries Research Institute greatly simplified escapement enumeration, and permitted accurate counting on systems where escapement counting previously had not been possible.

In addition to counting the escapement of red salmon, the tower crews perform another valuable service. Using beach seines, the crews intercept the migrating salmon and attempt to obtain about 200 live fish daily which are measured, sexed, a scale sample removed, weighed and notes made on gill net scars or predator wounds. The primary purpose of the sampling is to collect scale samples from which the total age, age at time of seaward migration and length of time spent in the ocean can be determined. This information is of utmost importance in this fishery because of the variety of age groups returning as adults in any given season. Thus, determining the percent and numbers of fish in each age class is a basic step in measuring the success of a particular spawning cycle in reproducing itself.

SMOLT OUTMIGRATION STUDIES

Smolt is the term used to describe the young red salmon which are migrating to the sea after spending from one to three years in the freshwater lakes after hatching. The eggs are deposited in the fall, during August and September as a rule, and hatch in early spring usually in February and March. The small fish then become residents of the lakes for one to three winters.

In May and June, those young salmon which are triggered by an unknown mechanism, leave freshwater and migrate to the sea. The size of the fish

at this time ranges from about 2 1/2 to 6 inches, depending mainly on the length of time they have spent in the lakes.

The smolt studies consist of a trapping scheme in order to sample this outmigration of young salmon. There are four such programs conducted each spring in Bristol Bay; on the Wood, Kvichak, Naknek and Ugashik rivers. The Department maintains and operates those on the Wood, Kvichak and Ugashik rivers, while the U. S. Bureau of Commercial Fisheries conducts the program on the Naknek River.

The ultimate objective of these programs is to provide an estimate of the total smolt population which would serve as a measure of spawning success and survival. However, only two of the programs are providing such an estimate at present, the Naknek and Ugashik smolt studies. These programs involve the use of mesh traps called fyke nets, and in the case of the Naknek and Ugashik studies, these nets are suspended from a cable stretched across the width of the stream. This system allows a cross-section sampling of the stream and provides a means of mathematically estimating a total population from such sampling.

The larger Wood River and Kvichak River do not readily lend themselves to such a system of sampling. The present sampling consists of a single fyke net which provides a measure of the relative abundance of smolt from year to year by fishing the same location in the same manner. In other words, the catches by this single net, compared to other years, gives an indication of the comparative size of the smolt production for each year. One additional feature used only on the Kvichak River program is electronic counting. As the smolt are funneled toward the tapering end of the fyke net, they pass through a 4 x 18 inch metal slot fitted with 2 battery-

powered electric-eye beams. The breaking of these beams are registered on high speed electric counters. Periodically, a cod end or closed bag is attached at the end of the net to collect a quantity of the smolt. These are weighed and a 1 pound sub-sample is then counted to obtain the total number in the larger sample. In this way, an actual count is obtained to compare with the electric counter counts since only a portion of the fish passing the electric beams are registered. This is termed calibration, and must be repeated frequently, especially during heavy migration in order to insure accuracy of the electronic counts as the passage rate of fish changes continually.

The greater production of fish in the Kvichak system makes the use of a somehwat automatic system desirable. On the other systems, the catches are recorded by manually removing the closed cod-end, weighing the fish and counting a 1 pound sub-sample, much as the calibration is done for the electric counter system.

Ways and means are being sought to improve the smolt study programs. This work is still comparatively new, and basically experimental. Many problems need to be resolved. However, the work is promising and the basic objective of determining the population size for different levels of parent escapement is of paramount importance to an understanding of the dynamics of the red salmon populations.

In addition to obtaining an index or an estimate of the total smolt migration, the smolt studies provide other useful information. Samples of the smolt are collected for individual lengths and weights as a measure of the condition of the smolt population. The comparative size and weight of the smolt for each year serves as an indicator to the general health of

the fish. Such factors as availability of feed, density of the fish and climatic conditions all play a role in determining the physical condition of the smolt. Scale samples are also collected from the small fish and these are used to determine the percent of 1, 2 and 3 winter smolt in the total outmigration for one season. It also determines the parent year each group is derived from. This information coupled with the age analysis from the adult fish gives a more complete picture of the success of each particular age class in contributing to the total production.

Another important use of the information obtained from the smolt programs is the forecasting of future returns. The smolt outmigration-return relationship is one method used for systems with a smolt program. Other methods employed are escapement-return relationship, relationship of the return of particular age groups and the abundance of immature salmon at sea.

Comparative summary information on the smolt programs is listed in Tables 49 through 51.

CATCH SAMPLING

There are four catch sampling stations operated in Bristol Bay to sample the commercial catch of the five districts. This program consists of one man located at a cannery to obtain representative samples of fish caught in the commercial fishery. These fish are measured, weighed, sexed and a scale sample collected. As in the escapement sampling, the basic objective is to provide enough information to construct a breakdown of these fish by age groups. Since so many fish are readily available in a cannery and this being the samplers primary job, much larger samples are

collected on the catch then from the escapement. However, this year a concerted effort to increase the escapement sample size resulted in 19,000 individual fish samples from the escapement plus 19,260 samples from the catch. As indicated previously, each red salmon run in Bristol Bay is comprised of several age groups. Primarily, the fish are 4, 5 and 6 year adults which have spent either 2 or 3 winters in the ocean. Altogether, there were 13 different age group combinations represented in the 1964 run. However several groups were insignificant in total numbers. The dominance of certain age groups varies from district to district and from year to year. Documenting these different age groups is a basic responsibility necessary for informed fisheries management.

TEST FISHING

Test fishing is a management tool initiated in Bristol Bay in 1960. This beginning effort of one boat in the Kvichak section has grown to a system employing a total of six boats in four of the five fishing districts. Two new programs were started in 1964, an outside test boat in the Nushagak and Egegik districts.

The primary purpose of the first test fishing effort was to provide an indication of the level of escapement prior to the delayed tower counts. The ability to quickly assess the escapement during the fishery is a vital element in effective management.

Inside test boats to sample the escapement are now operated in the Ugashik, Egegik and Kvichak systems. The method is similar in all instances; a 30 minute drift with 50 fathoms of gill net is made at a particular location, as close to the inside boundary line as possible at

each flood tide, or about every 12 hours throughout the season. Some variation exists on the stage of the tide fished due to differences in migration behavior of fish in the different systems.

The complete usefulness of the escapement test fishing presently can only be determined after the season when the sample catches are correlated with the actual escapement figures. Once this has been done for a number of years encompassing runs of various sizes, index values based upon the expected return of fish can be assigned to the sample catches which will give reliable estimates of the escapement. While lacking exact application in some instances, the escapement test fishing has proven to be an invaluable aid to the management biologist in balancing fishing periods to assure adequate escapements. Only additional effort and experience in the test fishing program will improve the quality of the results and determine its real value.

The outside test fishing program began as a sampling scheme to test for the presence or absence of fish, as a measure of the magnitude of the run prior to entering the fishery and to locate zones of migration. Initially, this was a seven day operation, with continuous sampling through closed and open periods of fishing. Through experience, the program has been modified, and in 1964 the outside test fishing was conducted only during periods closed to fishing.

Test fishing efforts are helping to develop a more exact idea of the migration patterns, the changes in these patterns for different years, timing of runs and related information which is useful to the management of the fishery. The value of test fishing and such information was fully demonstrated with the initial test fishing program in the Nushagak district

this year. The success of locating and timing the movement of the second and main peak of the red run, and securing a successful escapement, was due primarily to this test fishing effort.

Many other useful possibilities may be derived from test fishing as the program develops and becomes more refined. An attempt is being made with the outside Egegik boat to determine the areas and extent of possible intermixture between Egegik and Naknek-Kvichak stocks of red salmon. Scale samples taken from fish caught by the test boat on undisturbed fish during closed periods, both within and outside the fishing district are being analyzed to establish specific differences in scale characteristics if they exist.

Though the outside test fishing results are largely subjective at present, the information has been helpful in framing a general picture of the runs at a crucial time when there is little information or means to determine the status of a particular run. This has been especially critical in recent years where moderate or low returns coupled with high levels of gear registration have necessitated prolonged closures and reduced the margin of error on calculating allowable fishing time to virtually zero. The mobility and efficiency of the fishing fleet, plus the uncertainties created by a high seas fishery, places demands upon the management biologist to be able to accurately determine the status of the salmon run at any given time.

SUBSISTENCE FISHERY

The manipulation of the salmon harvest by open and closed fishing periods allows a portion of the run to enter the river and lake systems

as spawning escapement. Some of this escapement is utilized for subsistence purposes, both as food for human consumption and as dog food. The actual escapement then is the number of fish left after removal of the subsistence fish.

During some years in certain systems the subsistence requirements may exceed the total spawning population. Therefore, the subsistence requirements must be known and considered in commercial fisheries management. Undoubtedly present-day subsistence requirements are much less than in the past when a greater dependence upon natural resources existed for everyday living. However, there are still some areas in Bristol Bay where subsistence fish utilization is vital to the inhabitants. Unfortunately, documentation of this utilization is very limited. The only areas of substantial subsistence fishing at present are the Togiak, Nushagak and Lake Iliamna-Lake Clark drainages.

Catch record forms were distributed by the Department in 1963 on a voluntary basis to assist in tabulation of the subsistence catch. In addition, physical counts were made of the catch in some villages plus recording the number and capacity of smokehouses, number of people in each village surveyed and the number of sled dogs by village. Smokehouse capacity gives a reasonable figure for the subsistence harvest potential since it is customary to fish only until a smokehouse is filled.

Subsistence permits were distributed in the Nushagak and Togiak districts in 1963 on a trial basis. Estimates based upon a return of 52 of these catch records indicated a subsistence catch of 67,000 red salmon for both districts for human consumption. In addition a total of 19,000 salmon of other species were estimated for a conservative estimate

of 86,000 salmon entering the subsistence catch for human consumption. A survey of the number of sled dogs used in these areas, and figuring one-half fish per day per dog, yielded an estimated catch of 27,000 salmon of all species to sustain these animals.

A conservative total estimate of salmon utilized for subsistence purposes in the Nushagak and Togiak districts in 1963 was 114,000.

A physical count in five villages in the Lake Iliamna-Lake Clark drainage in late August of 1963 indicated a subsistence catch between 26,000 and 35,000 red salmon, or close to 10% of the total escapement of 339,000. A similar survey of subsistence utilization in this area was conducted by the Fisheries Research Institute (Kerns and Phinney, F.R.I. Circular No. 211, 1964) apparently at a later time in the fall, and their estimate placed the subsistence catch at 56,000 red salmon, or 17% of the total escapement. Another survey conducted by personnel of the Fisheries Research Institute in 1955, indicated a subsistence catch of 82,000 which was 33% of the 251,000 escapement that year.

Based upon total smokehouse capacity, the estimated potential for a subsistence harvest in this drainage, is at least 120,000 salmon.

A change in the 1965 Commercial Fishing Regulations on subsistence fishing provisions requires that a permit-catch record be completed by all subsistence fishermen in Bristol Bay. The documentation of this information in a consistent manner will fill one more gap in our knowledge of the total fishery.

Another possible benefit from such information is the use of the catches on the Newhalen River as an indicator of the escapement levels for the Lake Clark system. A large part of the total subsistence effort and catch

takes place on this river which drains Lake Clark. Aerial surveys in this system are normally limited to one or two streams due to glacial silt in the streams and lake. Therefore, the rise and fall of subsistence catches on this river may serve as a useful index of the escapements.

With increasing national and international pressures upon the salmon fisheries, it is essential that the management agency obtain all possible information on this natural resource which can no longer be taken for granted.

Information on the 1964 subsistence catch has not been received from all the villages at this time. A separate report on the subsistence fishery is in preparation for future publication.

SPAWNING GROUND SURVEYS

The Department conducts surveys of the red salmon spawning grounds each year, primarily in the Togiak, Nushagak, Egegik and Ugashik districts. Surveys in the Iliamna and Naknek systems are conducted by the Fisheries Research Institute and the U. S. Bureau of Commercial Fisheries respectively.

The surveys are accomplished mainly from aircraft, flying at low altitudes while an observer makes counts and estimates which are recorded on forms or maps. In the Nushagak system float trips are made on one or two key king salmon spawning streams for an escapement count. Some surveys are also made by boat.

The basic objective of these surveys is to obtain the distribution of spawners within a system, particularly the counts in major areas of spawning and to record the number of spawners occupying the three main types of spawning areas; beaches, rivers and creeks. The distribution of fish in

these different areas varies from year to year and may have an important bearing upon the probable success or production of a particular spawning population. The manipulation of the escapement for selective spawning distribution presents some interesting and complicated possibilities for management.

Considerable research work has been done on the Nushagak drainage for a number of years and a rather complete system of documenting the spawning ground distribution is carried out each year in this multi-lake system.

In 1964, Lake Aleknagik, the first in a series of four lakes, received approximately 75,000 red salmon spawners; Lake Nerka 350,000; Lake Beverly 270,000 and Lake Kulik, the last lake in the Wood River system, an estimated 135,000. Rivers between the four major lakes accounted for the remaining 246,000 fish. The percent of beach, creek and river spawners was 50%, 25% and 25% respectively.

Reports covering the spawning ground surveys in detail are published each year.

WATERSHED INVENTORY

A survey was initiated in the Nushagak district for the purpose of evaluating the existing physical watershed conditions. Basic information on the areas utilized by the various species of salmon is necessary for proper management. Surveys have been completed in the Wood River Lake system by the Fisheries Research Institute.

Surveys were conducted by the Alaska Department of Fish and Game in the Igushik Lake system and in three major tributary rivers of the Nushagak River system in 1964.

A complete survey was made of the 70 miles of spawning ground utilized by approximately 800,000 pink salmon in the Nuyakuk River. The King Salmon and the Stuyahok Rivers of the Nushagak River system were surveyed for most of their length. Pertinent information on the spawning areas utilized by reds, kings and chum salmon was noted.

Compilation of the spawning ground stream bottom characteristics plus other noteworthy comments are pending completion of the surveys.

Extension of the surveys into other districts is expected in the near future.

EGG SURVIVAL STUDIES

When funds and time allow, winter egg survival studies are carried out on a small scale by Commercial Fisheries personnel in Bristol Bay.

Cursory red salmon egg survival studies were conducted in the Wood River system during the winter of 1963-64.

Exceptionally severe winter conditions prevailed in the Wood River system during that period. Prolonged periods of low temperatures with little or no snow cover early in the winter with a continuous decrease of water levels in the rivers and lakes were considered the main factors in accounting for large egg mortality in the areas checked. An insulating snow cover did not occur until January. The snow covering (108.3 inches at Aleknagik) was heavy, but because of its retention until late spring, water levels continued to decrease.

From a series of periodic checks in the Little Togiak River, it was estimated that 58% of the total egg deposition was lost because of the low river level.

EXPERIMENTS IN RED SALMON RESTORATION

As elsewhere, mans influence upon fisheries resources has resulted in partial, and in some instances complete depletion of certain stocks. Several specific areas in Bristol Bay have been so affected and are either out of salmon production or else have only remanent populations. Experiments are being conducted to explore feasible methods for restoration of red salmon runs in these areas.

The streams selected for a pilot restoration study was Youth Creek which drains into Lake Aleknagik of the Wood River Lakes system. According to some reports, Youth Creek at one time supported a spawning population in excess of 10,000 red salmon. Aerial observations of the stream over a number of years confirms its discontinued use by spawning reds. Ground counts made in 1964 indicated only 20 spawners were utilizing the several miles of excellent spawning gravel. The reduction of this run is attributed to local subsistence fishing effort near the stream.

Hansen Creek which also drains into Lake Aleknagik and supports a sizeable red salmon population, was chosen as a source of eggs to be transplanted into Youth Creek. Approximately 50,000 eggs were taken from selected ripe females on August 9. For every six females (approximately 18,000 eggs) the sperm of 10 males was used to insure fertilization of the eggs. The freshly fertilized eggs were then placed in plastic containers, flown to Youth Creek and placed into pre-dug trenches 10 feet long and 8 to 9 inches deep. The locations were marked for periodic observations through the winter.

Bear Creek, located about three miles from Whitefish Creek and eight miles from the village of Aleknagik was the site of additional egg

restoration work. Approximately 15,000 red salmon eggs were taken from the large spawning escapement in Bear Creek August 12 and planted in Whitefish Creek to determine the practibility of using containers for hatching, plus a check on survival and hatching progress.

In the Whitefish Creek experiment, 2,500 eggs were placed in two 1/4 inch wire mesh containers, one measuring 2x4x6 inches and the other 4x6x10 inches. Ten thousand eggs were also placed in a perforated wooden container 4x12x18 inches. The wire mesh containers were buried in riffle gravel to a depth of about 6 inches and the wooden box was anchored on top of the gravel.

Periodic checks on the containers revealed the following as of the report: 60% of the eggs in the wire containers were eyed by October 4, 1964 and the remaining eggs were dead. The eggs in the wooden box had a 55% mortality by October 23, 1964. Of the remaining eggs, 15% died after becoming eyed. Silt collecting at one end of the containers was considered a contributing mortality factor.

Continued winter observations are planned on this project.

BEAVER DAM CONTROL

In 1964 the Commercial Fisheries Division initiated a beaver dam survey and removal program on the Wood River Lakes system.

It is generally recognized that beaver dams, in some instances, may impede the migration of salmon to spawning areas. In smaller streams, the size of the dams and reduced or altered water flow may act as a total barrier to migration. A complete aerial survey of the Wood River Lakes system revealed at least 12 beaver dams that could impede migrating red salmon traveling to spawning areas.

A total of seven beaver dams were removed from Whitefish Creek, which drains into Lake Aleknagik, the first lake in the Wood River series. All of the dams on this creek which were old and no longer in use were removed. The removal of these dams provided improved access for more red salmon spawners to unutilized spawning area above the dams and into the three small lakes at the head of the system.

Lack of time and priority of other projects necessitated termination of the beaver dam removal work before the remaining five dams could be cleared. However, future plans include a continuation and possible increase in this program.

FRESHWATER COMMERCIAL FISHERY

Considerable interest has developed over the recent efforts to undertake a freshwater commercial fishery in Bristol Bay. After some exploratory investigation during the winter of 1962-63, a group operating under the name of Alaska Fish, Inc. began a small-scale commercial fishery in the Lake Clark-Lake Iliamna watershed during the winter of 1963-64. The Department of Fish and Game in cooperation with the Department of Economic Development and Planning assisted in this venture.

A Fish and Game Aide was stationed at Iliamna to collect data on fish caught, fishing effort, water temperatures and other basic information. Periodic field trips to the area were made by staff biologists of the Sport Fish and Commercial Fisheries Divisions.

Though very little is known of the freshwater stocks in the numerous lakes of Bristol Bay, Lake Iliamna by virtue of its size and access by air service, offers the most reasonable possibilities for initiating such

a fishery in this area. Lake Iliamna is approximately 1,000 square miles in area and the largest lake in Alaska.

Freshwater species in the system offering possible commercial utilization are: lake trout, arctic char and Dolly Varden, cisco and two species of whitefish. The smaller cisco (Coregonus sardinella) and round whitefish (Prosopium cylindruaceum) may prove to be too small for real commercial value. Some interest has been shown in northern pike. Future commercial efforts would probably be directed upon the larger lake whitefish (Coregonus clupeaformis), humpback whitefish (Coregonus pidschian), lake trout, arctic char and Dolly Varden.

A total of 12 fishermen in four months of effort caught about 11,910 pounds of fish. Whitefish constituted 69% or 8,102 pounds, and the char species accounted for 31% or 3,749 pounds of the total catch. The average weight for whitefish was 1.5 pounds while the char averaged 2.5 pounds. The total value to the fishermen was $2,370.20.

Catches during the January-February period were small with the largest catches occurring in April and May, particularly in the lower end of Lake Clark where most of the fishing effort was concentrated.

Due to winter weather and operational problems, the fishery did not reach the level of effort that had been anticipated. While a considerable amount of data was collected from sampling what catches were made, the overall catch in limited locations is far from sufficient for providing an adequate basis upon which to determine any potential yield values. This, of course, is what would be desirable to know before venturing into such a fishery, but would involve a sampling program beyond the present means of the Department of Fish and Game.

Fishing activity increased briefly in the fall of 1964, but continuing operational problems have resulted in nearly a complete standstill during the winter months, and the only fishing effort at this time in the Lake Iliamna system is limited to two or three people doing exploratory fishing. It is anticipated that the fishery may gain momentum during the spring.

A complete report on results of sampling the fishery to date is being prepared for publication at this time.

TABLE 1 .--BRISTOL BAY LICENSE STATISTICS, 1960-1964

COMMERCIAL FISHING LICENSES	1960	1961	1962	1963	1964
Resident	1,422	2,112	1,993	2,258	2,494
Non-resident	745	1,506	933	1,344	1,231
TOTAL	2,167	3,618	2,926	3,602	3,725
VESSEL LICENSES					
Fishing vessels					
Resident	804	1,058	1,031	1,209	1,161
Non-resident	350	665	386	581	605
TOTAL	1,154	1,723	1,417	1,790	1,766
Scows					
Resident	22	14	30	33	15
Non-resident	28	46	19	32	35
TOTAL	50	60	49	65	50
GEAR LICENSES					
Resident					
150 F. drift net	561	674	715	766	815
100 F. drift net	89	106	76	148	132
50 F. set net	345	496	619	773	793
TOTAL	995	1,276	1,410	1,687	1,740
Non-resident					
150 F. drift net	342	600	383	509	639
100 F. drift net	22	38	17	36	50
50 F. set net	0	10	20	116	137
TOTAL	364	648	420	661	826
TOTAL GEAR	1,359	1,924	1,830	2,348	2,566
TOTAL LICENSES SOLD[1/]	4,730	7,325	6,222	7,805	8,107
TOTAL LICENSE REVENUES COLLECTED [2/]	$72,075	--	$87,725	$92,250	$113,359

1/ Information on total license sales indicates only those licenses sold in Bristol Bay

2/ Information on monies received for license sales reflects partial amounts collected within Bristol Bay

Source of Data
Alaska Department Fish and Game, Commercial Fisheries Division, Bristol Bay, 1960-1964

TABLE 2.--BRISTOL BAY PRE-SEASON GEAR REGISTRATION BY DISTRICT, 1963-1964

Fishing District	150 F. Drift		100 F. Drift		50 F. Set		Total	
	1963	1964	1963	1964	1963	1964	1963	1964
NAKNEK-KVICHAK								
Resident	213	202	41	39	275	236	529	477
Non-resident	330	386	3	7	25	13	358	406
TOTAL	543	588	44	46	300	249	887	883
EGEGIK								
Resident	73	101	21	27	150	176	244	304
Non-resident	62	143	10	22	41	66	113	231
TOTAL	135	244	31	49	191	242	357	535
UGASHIK								
Resident	56	61	2	4	98	126	156	191
Non-resident	36	52	0	1	17	28	53	81
TOTAL	92	113	2	5	115	154	209	272
NUSHAGAK								
Resident	357	366	53	62	247	251	657	679
Non-resident	54	57	24	20	36	30	114	107
TOTAL	411	423	77	82	283	281	771	786
TOGIAK								
Resident	86	85	0	0	1	4	87	89
Non-resident	1	1	0	0	0	0	1	1
TOTAL	87	86	0	0	1	4	88	90
BRISTOL BAY								
Resident	785	815	117	132	771	793	1,673	1,740
Non-resident	483	639	37	50	119	137	639	826
TOTAL	1,268	1,454	154	182	890	930	2,312	2,566

Source of Data

Alaska Department Fish and Game, Commercial Fisheries, Bristol Bay

TABLE 3.--BRISTOL BAY FISHING PERIODS BY DISTRICT, 1964

NAKNEK-KVICHAK DISTRICT

Date & Time				Hours
June 22	8am	June 23	8am	24
June 25	10am	June 26	10am	24
June 29	1pm	June 30	1pm	24
July 2	4pm	July 3	4pm	24
July 7	7am	July 7	7pm	12
Naknek Section Only				
July 6	6am	July 6	6pm	12
(Set net only in Kvichak Section)				
July 7	7pm	July 8	7pm	24
July 9	8pm	July 10	8pm	24
July 11	10am	July 12	10am	24
July 14	2pm	July 15	2pm	24
July 17	5am	July 18	5am	24
July 20	9am revert to 5 day week.			

Total fishing hours during regulatory period, June 22 - July 19:
Kvichak section: 108
Naknek section: 240

UGASHIK DISTRICT

Date & Time				Hours
June 22	9am	June 23	9am	24
June 25	10am	June 26	10pm	36
June 29	12 N	June 30	12 N	24
July 2	2pm	July 3	2pm	24
July 6	4pm	July 7	7am	15
July 8	8am	July 8	8pm	12
July 9	6am	July 9	9pm	15
July 10	7am	July 10	10pm	15
July 12	9am	July 13	12 N	27
July 13	12 N	July 14	12 N	24
July 14	12 N	July 15	12 N	24
July 15	12 N	July 16	12 N	24
July 16	12 N	July 20	9am	93
July 20	9am revert to 5 day week.			

Total fishing hours during regulatory period, June 22 - July 19: 357

EGEGIK DISTRICT

Date & Time				Hours
June 22	9am	June 23	9am	24
June 25	10am	June 26	10pm	36
June 29	1pm	June 30	1pm	24
July 2	3pm	July 3	3pm	24
July 6	7pm	July 7	7am	12
July 7	9pm	July 8	9am	12
July 8	7pm	July 9	7pm	24
July 9	7pm	July 10	7pm	24
July 13	12 N	July 14	12 N	24
July 14	12 N	July 15	12 N	24
July 15	12 N	July 20	9am	117
July 20	9am revert to 5 day week.			

Total fishing hours during regulatory period, June 22 - July 19: 345

NUSHAGAK DISTRICT

Date & Time				Hours
June 22	9am	June 23	9am	24
June 25	12 N	June 26	12 N	24
June 29	2pm	June 30	2pm	24
July 2	5pm	July 3	5pm	24
July 10	4am	July 10	4pm	12
July 11	12 N	July 11	12MN	12
July 11	12MN	July 20	9am	201
July 20	9am- revert to 5 day week.			

Total fishing hours during regulatory period, June 22 - July 19: 321

TOGIAK DISTRICT

Togiak district fished regular five day week, 9am Monday - 9am Saturday, during the regulatory period except for one closure, 6pm July 16 - 9 am July 21, for a total of 435 fishing hours.

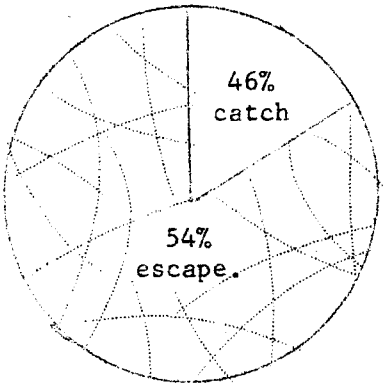
Source of Data

Alaska Department Fish and Game, Commercial Fisheries, Bristol Bay

FISHING TIME BY FISHING DISTRICT
BRISTOL BAY - 1964

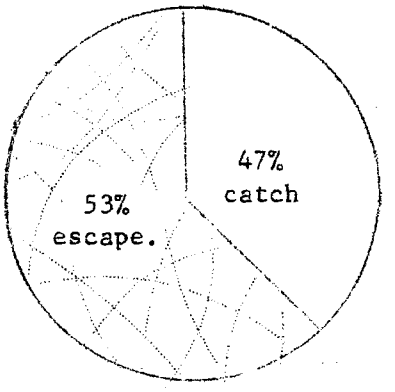
A circle represents the total number of hours comprising the regulatory period.
White area represents the fishing hours during the regulatory period.
Figures in circle sectors are percent of total return to the district.

KVICHAK DISTRICT



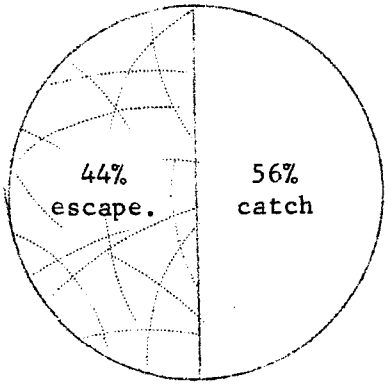
Fishing time = 17%

NAKNEK DISTRICT



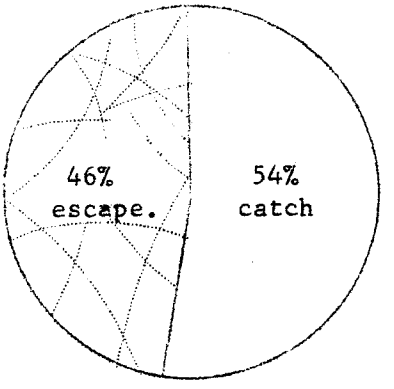
Fishing time = 37%

EGEGIK DISTRICT



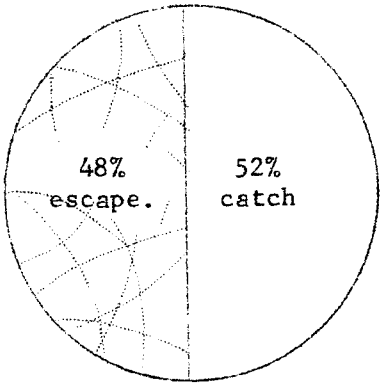
Fishing time = 53%

UGASHIK DISTRICT



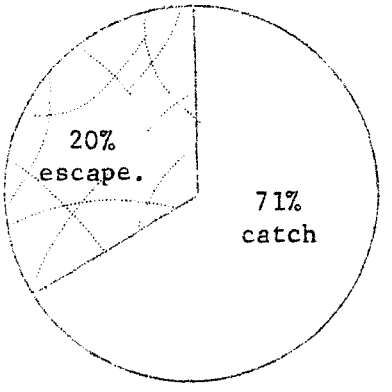
Fishing time = 55%

NUSHAGAK DISTRICT



Fishing time = 50%

TOGIAK DISTRICT



Fishing time = 68%

TABLE 4.--NAKNEK-KVICHAK DISTRICT PRELIMINARY CATCH BY SPECIES, 1964

Period	Hours	Reds	Kings	Chums	Pinks	Cohos	$\bar{X}$ Chum %	Total
To 6/20		2,660	3,084	696			20.74	6,440
6/22-23	24	9,260	1,330	1,573	1		14.52	12,164
6/25-26	24	99,708	3,066	3,714			3.59	106,488
6/29-30	24	248,277	377	9,275			3.60	257,929
7/2-3	24	236,068	1,664	8,642			3.53	246,374
7/6	12	541,822	251	929			0.17	543,002
7/7-8	24	737,444	417	14,050			1.87	751,911
7/9-10	24	206,710	314	3,720			1.77	210,744
7/11-12	24	86,121	505	1,248			1.43	87,874
7/14-15	24	35,274	319	16,146			31.40	51,739
7/17-18	24	27,179	411	26,886	77	2	49.73	54,555
7/20-8/1	10-days	40,697	512	64,433	14,901	151	61.29	120,694
8/3-8	5-days	395	17	827	22,899	705	67.68	24,843
8/10 --		79		364	3,936	904	82.17	5,283
Total		2,271,694	12,267	152,503	41,814	1,762	6.29	2,480,040
Percent of district catch		91.60	0.49	6.15	1.69	0.07		100.00

Source of Data

Alaska Department of Fish and Game, Commercial Fisheries Division, Bristol Bay

TABLE 5.--EGEGIK DISTRICT PRELIMINARY CATCH BY SPECIES, 1964

Period	Hours	Reds	Kings	Chums	Pinks	Cohos	$\bar{X}$ Chum %	Total
To 6/20		18,082	1,264	1,437			7.36	20,783
6/22-23	24	28,429	550	1,967			6.47	30,946
6/25-26	36	152,685	674	3,669			2.35	157,028
6/29-30	24	64,435	264	2,201			3.30	66,900
7/2-3	24	59,066	295	2,723			4.41	62,084
7/6-7	12	198,611	88	421			0.21	199,120
7/7-8	12	72,902	42	1,614			2.17	74,558
7/8-10	48	266,159	102	2,317			0.86	268,578
7/13-8/8	23-days	77,351	107	4,537	409	911	5.54	83,315
8/10-15	5-days					240		240
8/17-22	5-days					411		411
8/24-29	5-days					356		356
Total		937,720	3,386	20,886	409	1,918	2.17	964,319
Percent of district catch		97.24	0.35	2.17	0.04	0.20		100.00

Source of Data

Alaska Department Fish and Game, Commercial Fisheries Division, Bristol Bay

TABLE 6.--UGASHIK DISTRICT PRELIMINARY CATCH BY SPECIES, 1964

Period	Hours	Reds	Kings	Chums	Pinks	Cohos	$\bar{X}$ Chum %	Total
To 6/20		8	1,619	1			11.11	1,628
6/22-23	24	6,022	241	497			7.62	6,760
6/25-26	36	27,536	583	1,223			4.25	29,342
6/29-30	24	22,303	242	1,527			6.41	24,072
7/2-3	24	59,977	180	2,448			3.92	62,605
7/6-7	15	49,772	58	514			1.02	50,344
7/8	12	31,359	45	625			1.95	32,029
7/9	15	65,820	45	1,666			2.47	67,531
7/10	15	131,466	77	3,151			2.34	134,694
7/12-20	192	171,992	222	13,962		68	7.51	186,244
7/20-25	5-days	12,143	29	3,066			20.16	15,238
7/27-8/1	5-days	3,102	3	1,684			35.19	4,789
8/3 --		659	1	404		3,200	38.01	4,264
Total		582,159	3,345	30,768		3,268	5.02	619,540
Percent of district catch		93.97	0.54	4.96		0.53		100.00

Source of Data

Alaska Department Fish and Game, Commercial Fisheries Division, Bristol Bay

TABLE 7.--NUSHAGAK DISTRICT PRELIMINARY CATCH BY SPECIES, 1964

Period	Hours	Reds	Kings	Chums	Pinks	Cohos	$\bar{X}$ Chum %	Total
To 6/20		9,091	71,831	32,244		2	78.00	113,168
6/22-23	24	8,304	2,984	9,604	2		53.63	20,894
6/25-26	24	77,460	15,294	68,931	3		47.09	161,688
6/29-30	24	154,634	1,795	64,839	7		29.54	221,275
7/2-3	24	612,067	925	49,551	7	1	7.49	662,551
7/10	12	260,113	1,711	74,723	3,565	3	22.32	340,115
7/11-20	213	205,617	3,902	107,726	181,106	1,419	34.38	499,770
7/20-25	5-days	43,200	368	26,675	757,482	5,388	38.17	833,113
7/27-8/1	5-days	8,436	70	7,088	358,444	8,721	45.66	382,759
8/3-8	5-days	1,356	20	1,288	50,893	14,767	48.71	68,324
8/10-15	5-days	36		104	2,059	1,362	74.29	3,561
Total		1,380,314	98,900	442,773	1,353,568	31,663	24.29	3,307,218
Percent of district catch		41.74	2.99	13.39	40.93	0.95		100.00

Source of Data

Alaska Department Fish and Game, Commercial Fisheries Division, Bristol Bay

TABLE 8.--TOGIAK DISTRICT[1/] PRELIMINARY CATCH BY SPECIES, 1964

Period	Hours	Reds	Kings	Chums	Pinks	Cohos	$\bar{X}$ Chum %	Total
To 6/20		542	1,679	542	3		50.00	2,766
6/22-27	5-days	12,570	3,530	18,730	8		59.84	34,838
6/29-7/4	5-days	33,832	2,734	27,422	25	4	44.77	64,017
7/6-11	5-days	84,615	2,718	42,356	84		33.36	129,773
7/13-16	4-days	49,660	429	21,456	70		30.17	71,615
7/21-25	4-days	52,620	109	21,119	536	1	28.64	74,385
7/27-8/1	5-days	22,117	16	5,971	780	34	21.26	28,918
8/3-8	5-days	8,004	12	1,546	281	380	16.19	10,223
8/10-15	5-days	2,433	4			1,654	0.00	4,091
8/17-22	5-days	706				3,376	0.00	4,082
Total		267,099	11,231	139,142	1,787	5,449	34.25	424,708
Percent of district catch		62.89	2.65	32.76	0.42	1.28		100.00

1/ Includes 15,811 Kulukak fish: reds - 8,286, kings - 313, chums - 7,198, pinks - 14

Source of Data

Alaska Department Fish and Game, Commercial Fisheries Divison, Bristol Bay

TABLE 9.--SUMMARY OF BRISTOL BAY PRELIMINARY CATCH BY DISTRICT & SPECIES, 1964

District and Sub-District	Reds	Kings	Chums	Pinks	Cohos	Chum %	Total
NAKNEK-KVICHAK							
Kvichak	772,950						
Branch	276,934						
Naknek	1,221,810						
Total	2,271,694	12,267	152,503	41,814	1,762	6.29	2,480,040
EGEGIK	937,720	3,386	20,886	409	1,918	2.17	964,319
UGASHIK	582,159	3,345	30,768		3,268	5.02	619,540
NUSHAGAK							
Wood	1,043,949						
Igushik	185,320						
Snake	14,226						
Nuyakuk	136,819						
Total	1,380,314	98,900	442,773	1,353,568	31,663	24.29	3,307,218
TOGIAK	267,099	11,231	139,142	1,787	5,449	34.25	424,708
Total	5,438,986	129,129	786,072	1,397,578	44,060	12.63	7,795,825

SPECIES PERCENT OF SEASON CATCH

Reds	=	69.77%
Kings	=	1.66%
Chums	=	10.08%
Pinks	=	17.93%
Cohos	=	0.56%

Source of Data

Alaska Department Fish and Game, Commercial Fisheries Division, Bristol Bay

TABLE 10.--FINAL BRISTOL BAY RED SALMON CATCH BY DISTRICT FISHING PERIODS, 1964

NAKNEK-KVICHAK		EGEGIK		UGASHIK	
Period	Catch	Period	Catch	Period	Catch
To 6/20	2,796	To 6/20	18,148	To 6/20	817
6/22-23	9,839	6/22-23	28,162	6/22-23	5,959
6/25-26	100,051	6/25-26	186,550	6/25-26	27,141
6/29-30	246,716	6/29-30	72,779	6/29-30	21,842
7/ 2- 3	229,722	7/ 2- 3	53,469	7/ 2- 3	61,349
7/ 6	470,426	7/ 6- 7	241,046	7/ 6- 7	75,407
7/ 7- 8	792,535	7/ 7- 8	115,776	7/ 8	50,766
7/ 9-10	208,631	7/ 8-10	303,482	7/ 9	38,191
7/11-12	85,328	7/13-8/8	84,523	7/10	101,553
7/14-15	21,039			7/12-20	177,254
7/17-18	37,976			7/20-25	12,828
7/20-8/1	38,116			7/27-8/1	3,018
8/ 3- 8	394			8/ 3- 8	643
8/10-20	132				
Total	2,243,701	Total	1,103,935	Total	576,768

NUSHAGAK		TOGIAK	
Period	Catch	Period	Catch
To 6/20	9,327	To 6/20	538
6/22-23	8,521	6/22-27	12,508
6/25-26	77,419	6/29-7/4	34,340
6/29-30	163,328	7/ 6-11	69,409
7/ 2- 3	628,013	7/13-16	49,391
7/10	242,581	7/21-25	51,975
7/11-17	236,715	7/27-8/1	22,359
7/20-25	36,660	8/ 3- 8	7,081
7/27-8/1	15,678	8/10-15	2,468
8/ 3- 8	2,663	8/17-22	706
8/10-15	36		
Total	1,420,941	Total	250,775

BRISTOL BAY TOTAL 5,596,120

TABLE 11.--COMPARATIVE BRISTOL BAY RED SALMON CATCH IN NUMBERS OF FISH BY DISTRICT, 1951-1964

Year	Naknek Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1951	2,926,413	644,551	318,629	436,950	-	4,326,543
1952	9,401,060	886,852	280,146	698,071	-	11,266,129
1953	3,738,839	1,234,600	688,720	449,341	-	6,111,500
1954	1,819,666	1,437,791	1,067,531	315,357	12,280	4,652,625
1955	2,546,341	622,885	240,817	1,054,978	66,085	4,549,106
1956	5,987,750	1,187,108	341,499	1,263,186	101,933	8,881,476
1957	4,578,643	814,459	350,858	491,498	40,044	6,275,502
1958	922,611	500,684	433,813	1,092,156	36,402	2,985,666
1959	1,689,425	662,391	423,414	1,719,687	113,202	4,608,119
1960	9,847,848	1,446,884	752,634	1,517,988	139,648	13,705,002
1961	8,166,983	2,686,076	357,223	511,483	192,161	11,913,926
1962	2,281,284	638,862	243,159	1,461,766	92,945	4,718,016
1963	957,902	695,558	188,695	842,744	186,283	2,871,182
1964[2/]	2,271,694	937,720	582,159	1,380,314	267,099	5,438,986
14 Year Average	4,082,461	1,028,318	447,807	945,394	113,456[1/]	6,593,124

1/ 11 year average for Togiak district
2/ Preliminary data

Source of Data

Alaska Commercial Salmon Catch Statistics, 1951-1959, Statistical Digest No. 50, by U. S. Bureau of Commercial Fisheries

Statistical Yearbooks, 1952-1961, International North Pacific Fisheries Commission

Alaska Department Fish & Game, 1960-1964, Division of Statistics

TABLE 12.--COMPARATIVE BRISTOL BAY KING SALMON CATCH IN NUMBERS OF FISH BY DISTRICT, 1951-1964

Year	Naknek Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1951	5,009	342	606	34,226	-	40,183
1952	11,404	972	632	39,848	-	52,856
1953	13,848	743	463	27,502	-	42,556
1954	7,101	9,777	1,093	38,045	-	56,016
1955	11,448	3,079	3,160	56,463	1,279	75,429
1956	6,006	1,448	616	57,441	866	66,377
1957	5,524	4,139	883	79,122	1,752	91,420
1958	8,391	3,155	2,368	87,245	2,048	103,207
1959	15,298	3,282	5,493	54,299	5,917	84,289
1960	11,778	2,991	2,209	81,416	7,309	111,703
1961	10,206	3,266	3,483	60,953	10,748	88,656
1962	8,816	2,070	2,929	61,283	8,949	84,047
1963	4,713	2,355	3,030	45,979	6,192	62,269
1964[1/]	12,267	3,386	3,345	98,900	11,231	129,129
14 year average	9,844	2,929	2,165	58,766	5,629[2/]	77,724

1/ Preliminary catch data
2/ 10 year average for Togiak district

Source of Data
Alaska Commercial Salmon Catch Statistics, 1951-1959, Statistical Digest No. 50, by U. S. Bureau of Commercial Fisheries

Alaska Department Fish and Game, 1960-1964, Division of Statistics

TABLE 13.--COMPARATIVE BRISTOL BAY CHUM SALMON CATCH IN NUMBERS OF FISH BY DISTRICT, 1951-1964

Year	Naknek Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1951	38,844	15,439	16,843	85,624	-	156,750
1952	93,835	18,060	19,651	117,875	-	249,421
1953	212,112	26,724	21,027	127,483	-	387,346
1954	138,016	62,040	39,384	159,852	1,352	400,644
1955	39,405	23,238	51,280	97,521	735	212,179
1956	93,841	16,713	6,934	172,546	25,483	315,517
1957	45,620	12,849	13,226	143,461	44,186	259,342
1958	119,324	12,089	12,714	193,688	20,277	358,092
1959	200,458	29,407	20,185	186,891	44,575	481,516
1960	304,286	62,837	51,415	642,099	255,320	1,315,957
1961	182,398	57,429	30,928	267,176	190,001	727,932
1962	176,712	23,053	22,040	290,633	165,107	677,545
1963	100,408	14,807	10,554	167,161	77,167	370,097
1964[1/]	152,503	20,886	30,768	442,773	139,142	786,072
14 year average	135,554	28,255	24,782	221,056	87,577[2/]	478,460

1/ Preliminary catch data

2/ 11 year average for Togiak district

Source of data
Alaska Commercial Salmon Catch Statistics, 1951-1959, Statistical Digest No. 50, by U. S. Bureau of Commercial Fisheries

Alaska Department Fish and Game, 1960-1964, Division of Statistics

TABLE 14.--COMPARATIVE BRISTOL BAY PINK SALMON CATCH IN NUMBERS OF FISH BY DISTRICT, 1951-1964

Year	Naknek Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1951	11	-	-	23	-	34
1952	6,277	-	1,000	6,852	-	14,129
1953	7	2	-	3	-	12
1954	1,925	-	-	99,207	1,850	102,982
1955	-	-	-	9	-	9
1956	511	4	-	91,457	-	91,972
1957	2	24	-	3	-	29
1958	19,666	492	-	1,113,794	1,590	1,135,542
1959	25	6	78	137	55	301
1960	10,582	-	-	289,781	1,669	302,032
1961	42	3	-	248	245	538
1962	32,436	43	1	880,424	1,030	913,934
1963	56	1	2	226	176	461
1964[1/]	41,814	409	-	1,353,568	1,787	1,397,578
7 year[2/] average	16,173	135	143	547,869	1,321[3/]	565,453

1/ Preliminary catch data
2/ Includes only even years
3/ 6 year average for Togiak district

Source of Data

Alaska Commercial Salmon Catch Statistics, 1951-1959, Statistical Digest No. 50, by U. S. Bureau of Commercial Fisheries

Alaska Department Fish and Game, 1960-1964, Division of Statistics

TABLE 15.--COMPARATIVE BRISTOL BAY COHO SALMON CATCH IN NUMBERS OF FISH BY DISTRICT, 1951-1964

Year	Naknek Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1951	1,404	2,520	35,683	2,856	-	42,463
1952	11	-	2,936	2,067	-	5,014
1953	660	1,761	-	2,195	-	4,616
1954	111	2,932	70	20,423	-	23,536
1955	123	4,208	2,777	13,920	-	21,028
1956	887	8,573	-	53,999	-	63,459
1957	1,619	4,056	-	61,454	1,616	68,745
1958	3,624	4,370	746	127,088	-	135,828
1959	40	1,388	1,397	12,779	1,731	17,335
1960	197	2,421	-	13,457	65	16,140
1961	426	3,533	16	16,653	5	20,633
1962	2,474	3,828	4,553	28,418	11	39,284
1963	6,823	910	2,743	29,648	1,138	41,262
1964[1/]	1,762	1,918	3,268	31,663	5,449	44,060
14 year average	1,440	3,030	3,871	29,759	1,252[2/]	38,815

1/ Preliminary catch data
2/ 8 year average for Togiak district

Source of Data
Alaska Commercial Salmon Catch Statistics, 1951-1959, Statistical Digest No. 50, by U. S. Bureau of Commercial Fisheries

Alaska Department Fish and Game, 1960-1964, Division of Statistics

TABLE 16.--COMPARATIVE BRISTOL BAY SALMON CATCH IN NUMBERS OF FISH BY DISTRICT, 1951-1964
ALL SPECIES

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1951	2,971,681	662,852	371,761	559,679	-	4,565,973
1952	9,512,587	905,884	304,365	864,713	-	11,587,549
1953	3,965,466	1,263,830	710,210	606,524	-	6,546,030
1954	1,966,819	1,512,540	1,108,078	632,884	15,482	5,235,803
1955	2,615,317	653,410	298,034	1,222,891	68,099	4,857,751
1956	6,088,995	1,213,846	349,049	1,638,629	128,282	9,418,801
1957	4,631,408	835,527	364,967	775,538	87,598	6,695,038
1958	1,073,616	520,790	449,641	2,613,971	60,317	4,718,335
1959	1,905,246	696,474	450,567	1,973,793	165,480	5,191,560
1960	10,180,691	1,515,133	806,258	2,544,741	404,011	15,450,834
1961	8,360,055	2,750,307	391,650	856,513	393,160	12,751,685
1962	2,501,722	667,856	272,682	2,722,524	268,042	6,432,826
1963	1,069,902	713,631	205,024	1,085,758	270,956	3,345,271
1964[1/]	2,480,040	964,319	619,540	3,307,218	424,707	7,795,825
14 year average	4,237,396	1,062,600	478,702	1,528,955	207,830[2/]	7,470,949

1/ Preliminary catch data
2/ 11 year average for Togiak district

Source of Data
Alaska Commercial Salmon Catch Statistics, 1951-1959, Statistical Digest No. 50, by U. S. Bureau of Commercial Fisheries

Alaska Department Fish and Game, 1960-1964, Division of Statistics

TABLE 17.--BRISTOL BAY CASE PACK BY SPECIES, 1951-1964[1/]

Year	Reds	Kings	Chums	Pinks	Cohos	Total
1951	309,936	4,661	15,744	0	4,366	334,707
1952	715,083	11,380	31,457	1,339	793	760,052
1953	445,535	8,050	37,052	3	333	490,973
1954	308,405	9,266	32,232	4,732	2,839	357,474
1955	312,284	13,089	20,701	0	1,928	348,002
1956	529,726	9,386	24,450	3,918	4,133	571,613
1957	471,979	16,285	23,940	0	4,220	516,424
1958	241,099	24,844	34,954	61,740	10,555	373,192
1959	332,713	17,364	42,812	0	2,582	395,471
1960	854,807	19,566	103,569	12,055	3,073	993,070
1961	926,441	15,501	51,828	0	1,980	995,750
1962	361,226	16,797	58,571	38,638	2,941	478,173
1963	217,901	9,495	34,157	2	4,296	265,851
1964[2/]	380,280	23,453	66,442	60,475	4,770	535,420
14 year average	457,673	14,224	41,279	26,128[3/]	3,487	529,726

1/ Figures represent cases on basis of 48 one-pound cans per case. Does not include frozen or cured fish

2/ Preliminary figures

3/ Average pink case pack includes even years only

Source of Data

Alaska Fishery and Fur-Seal Industries, 1951, by U. S. Bureau of Commercial Fisheries, Statistical Digest No. 31

Statistical Yearbooks, 1952-1961, International North Pacific Fisheries Commission

Statistical Leaflet No. 7, 1962-1963, Alaska Department of Fish & Game, 1960-1963, Division of Statistics

TABLE 18.--BRISTOL BAY FISH PER CASE BY SPECIES, 1951-1964

Year	Reds	Kings	Chums	Pinks	Cohos
1951	11.87	4.53	10.87	18.16	10.29
1952	13.69	5.12	10.34	13.37	10.57
1953	11.91	5.22	10.16	23.09	10.30
1954	12.04	4.79	10.26	18.47	10.69
1955	12.77	4.13	9.84	---	11.17
1956	12.91	4.15	11.50	20.93	12.64
1957	11.79	3.81	10.21	---	---
1958	12.30	4.20	9.40	18.20	12.80
1959	12.80	4.10	11.40	23.00	7.80
1960	14.58	6.19	12.58	17.27	11.34
1961	11.93	4.43	11.25	19.19	7.39
1962	12.45	4.66	11.47	25.80	12.10
1963	12.15	5.49	11.36	---	12.21
1964[1/]	13.57	5.31	11.01	25.58	12.58
14 year[4/] average	12.60	4.68	10.80	19.50[2/]	10.77[3/]

1/ Preliminary data
2/ Average fish per case includes even years only; 7 year average
3/ 13 year average
4/ Geometric mean

Source of Data
Alaska Department Fish and Game, 1951-1963, Division of Statistics
Alaska Department Fish and Game, Commercial Fisheries Division, 1964 by Bristol Bay Area Staff

TABLE 19.--BRISTOL BAY FROZEN & CURED FISH 1961-1964
COMPARATIVE CATCH

Year	Reds	Kings	Chums	Pinks	Cohos	Total
1961	170,745	11,585	348	--	--	182,678
1962	27,926	4,510	2,665	--	4,073	39,174
1963	34,641	3,917	11,690	1	4,028	54,277
1964	80,787	9,011	3,295	276	8,956	102,325
4 year average	78,525	7,256	4,500		5,686[1/]	94,614

1/ 3 year average

Source of Data
Alaska Department Fish and Game, 1961-1964, Fisheries Management staff

TABLE 20.--BRISTOL BAY AVERAGE WEIGHT BY SPECIES[1/] 1960-1964

Year	Reds	Kings	Chums	Pinks	Cohos
1960	4.8	11.8	6.2	4.4	6.7
1961	5.9	16.8	6.9	4.1	12.4
1962	5.6	15.7	6.8	3.2	6.3
1963	5.2	13.2	6.3	3.3	6.9
1964[2/]	5.2	13.7	7.1	3.0	6.0
5 year[3/] average	5.3	14.1	6.7	3.6	7.4

1/ Round weight to nearest tenth of pound
2/ Preliminary data
3/ Geometric means

Source of Data
Statistical yearbooks, 1960-1961, International North Pacific Fisheries Commission
Statistical Leaflets, Alaska Department Fish and Game, 1962-1963
Alaska Department Fish and Game, 1964, Fisheries Management staff

TABLE 21.--Iliamna Lake Commercial Freshwater Fisheries Catch and Value to the Fishermen, 1964

Lake Iliamna	Month	Dressed Pounds of Arctic Char	Avg. Wt. 1/	Dressed Pounds of Lake Trout	Avg. Wt. 1/	Dressed Pounds of Whitefish	Avg. Wt. 1/	Dressed Pounds of Pike	Avg. Wt.	Fishermen Effort	Total Pounds	Total Value
	March	312	2.6	40	3.1	--	--	--	--	3	352	$ 70.40
	April	377	2.9	--	--	20	1.2	--	--	4	397	79.40
	May	909	2.3	12	4.0	82	1.3	--	--	7	1,003	200.60
	June	246	1.1	30	3.0	145	1.5	--	--	9	421	84.20
Sub-total		1,844	3.0	82	3.4	247	1.8	--	--	12 2/	2,173	$ 434.60
	Sept.	1,041	2.1	--	--	--	--	--	--	8	1,041	208.20
	Oct.	1,921	1.5	296	3.3	8	1.0	32	2.1	10	2,257	448.20
	Nov.	1,690	1.1	--	--	562	2.5	--	--	13	2,252	450.40
	Dec.	57	1.1	--	--	--	--	--	--	2	57	11.40
Sub-total		4,709	1.1	296	3.3	570	2.5	32	2.1	14 2/	5,607	$1,118.20
Grand Total		6,553		378		817		32			7,780	$1,552.80

1/ Average weight of fish for the period March through June is weighted by the monthly catch

2/ Total number of individual fishermen involved in the fishery

TABLE 22.--Lake Clark Commercial Freshwater Fisheries Catch and Value to the Fishermen, 1964

Lake Clark	Month	Dressed Pounds of Lake trout	Avg. Wt. [1]	Dressed Pounds of Whitefish	Avg. Wt. [1]	Dressed Pounds of Pike	Avg. Wt.	Dressed Pounds of Burbot	Avg. Wt.	Fishermen Effort	Total Pounds	Total Value
	April	273	2.7	1,386	1.5	--	--	--	--	8	1,659	$ 331.80
	May	1,363	2.8	4,205	1.5	--	--	--	--	12	5,568	1,113.60
	June	187	2.5	2,264	1.5	--	--	--	--	10	2,451	490.20
Sub-total		1,823	2.8	7,855	1.5					12 [2]	9,678	$1,935.60
	Sept.	295	2.9	674	1.2	--	--	--	--	7	969	193.80
	Oct.	1,590	2.4	6,678	1.3	133	4.9	8	1.0	15	8,409	1,667.70
	Nov.	118	3.1	458	1.2	27	6.3	--	--	3	603	117.90
	Dec.	43	1.2	846	1.2	--	--	--	--	3	889	177.80
Sub-total		2,046	3.0	8,656	1.3	160	4.2	8	1.0	17 [2]	10,870	$2,157.20
Grand Total		3,869		16,511		160		8			20,548	$4,092.80

1/ Average weight of fish for the period April through June is weighted by the monthly catch

2/ Total number of individual fishermen involved in the fishery

TABLE 23.--SUMMARY OF 1964 BRISTOL BAY RED SALMON ESCAPEMENT GOALS

NAKNEK-KVICHAK DISTRICT	Predicted Return[1]	1964 Goal	Desired Optimum Escapement Range
Kvichak River	8,300,000	5,000,000	4,500,000 - 8,000,000
Naknek River	1,800,000	850,000	750,000 - 1,250,000
Alagnak (Branch) River	2,400,000	500,000	250,000 - 750,000
TOTAL	12,500,000	6,350,000	5,500,000 -10,000,000
NUSHAGAK DISTRICT			
Wood River	1,400,000	900,000	800,000 - 1,500,000
Igushik River	900,000	250,000	250,000 - 450,000
Snake River	10,000[2]	10,000	50,000 - 150,000
Tikchik River	100,000	100,000	150,000 - 300,000
Nushagak-Mulchatna	10,000[2]	10,000	20,000 - 50,000
TOTAL	2,400,000	1,270,000	1,270,000 - 2,450,000
EGEGIK DISTRICT	1,600,000	850,000	750,000 - 1,150,000
UGASHIK DISTRICT[3]	900,000	600,000	500,000 - 1,000,000
TOGIAK DISTRICT			
Togiak River	200,000[2]	100,000	100,000 - 200,000
Togiak Tributaries	50,000[2]	25,000	20,000 - 50,000
Kulukak System	10,000[2]	5,000	10,000 - 20,000
TOTAL	260,000	130,000	130,000 - 270,000
TOTAL JOINT PREDICTION	17,400,000	9,200,000	8,150,000 -14,870,000
TOTAL BAY PREDICTION	17,680,000		

1/ Bristol Bay Red Salmon Forecast of Run for 1964, Alaska Department Fish and Game, Informational Leaflet 39

2/ System prediction by Alaska Department Fish and Game. Not included in joint Bristol Bay prediction

3/ Excluding Mother Goose system return

TABLE 24.--KVICHAK RIVER DAILY
RED SALMON ESCAPEMENT COUNTS, 1959-1964

Date	1959	1960	1961	1962	1963	1964
6/20					48	
21	308	402			48	
22	623	135	120	584	96	0
23	307	312	120	486	72	0
24	99	90	120	708	66	18
25	212		264	276	66	132
26	914	18	3,378	780	54	300
27	416	186	51,192	5,922	30	186
28	1,133	2,322	88,884	5,670	30	522
29	440	1,776	134,934	3,366	702	348
30	1,098	1,998	122,316	5,724	5,628	468
7/ 1	588	9,747	78,510	29,868	10,368	1,074
2	384	155,394	33,804	153,798	5,598	1,554
3	1,152	221,586	270,726	123,996	7,986	1,848
4	7,872	361,572	232,488	43,758	5,100	1,020
5	49,612	384,012	375,048	91,842	5,082	624
6	51,288	359,946	470,478	242,700	18,606	8,406
7	48,780	586,728	420,846	509,478	40,944	31,482
8	30,758	644,058	261,840	413,238	36,000	64,752
9	12,524	702,966	146,634	537,216	31,434	78,852
10	19,097	727,644	72,684	329,652	7,032	44,460
11	32,627	1,075,212	169,254	50,370	24,246	56,898
12	21,285	1,332,329	128,100	2,424	32,970	51,444
13	52,818	1,046,130	200,028	2,526	25,608	176,682
14	88,226	972,978	161,700	4,014	22,188	126,720
15	90,994	943,860	125,376	2,538	12,018	71,004
16	55,343	1,001,322	48,552	2,904	7,632	55,392
17	23,398	1,116,582	14,634	5,514	7,776	28,410
18	16,093	1,262,790	24,546	3,978	9,288	12,528
19	17,357	928,770	26,826	1,392	5,358	17,232
20	13,225	529,158	10,848	360	5,598	17,160
21	9,140	115,725	5,166	684	3,768	19,896
22	5,637	39,345	8,628	282	2,202	15,852
23	5,631	36,324	6,393	714	960	17,550
24	3,801	22,457	4,038	942	1,442	28,434
25	1,514	9,678	2,760	570	1,146	12,762
26	2,119	8,808	2,508	870	678	6,408
27	2,189		960	1,140	528	1,902
28	2,592		642	396	228	1,272
29	1,800		264	204	84	1,182
30	390		180		42	1,086
31			60		12	756
8/ 1	6,216*	27,640*			18	504
Total	680,000	14,630,000	3,705,849	2,580,884	338,760	957,120

* Estimated late season migration

TABLE 25.--BRANCH (ALAGNAK) RIVER
DAILY RED SALMON ESCAPEMENT COUNTS, 1959-1964

Date	1959	1960	1961	1962	1963	1964
6/26		6			0	
27		0	735		0	
28	375	6	2,214		0	
29	1,128	0	8,295		114	
30	1,143	54	4,968	150	4,038	
7/ 1	258	2,652	276	444	3,576	
2	870	72,018	150	5,340	8,970	156
3	1,350	120,792	3,102	3,252	5,814	48
4	27,198	37,926	21,402	3,648	5,304	18
5	68,544	13,170	11,364	4,788	20,556	1,032
6	68,650	50,700	5,292	27,870	37,086	30,504
7	82,179	162,516	588	24,060	29,658	45,162
8	25,017	199,386	324	11,994	12,390	100,758
9	19,455	185,598	216	2,718	3,426	7,548
10	28,791	134,592	372	1,752	17,964	5,322
11	3,174	81,912	462	672	17,376	23,286
12	53,655	32,910	1,770	786	11,328	13,836
13	96,355	22,860	7,998	252	7,578	9,660
14	124,545	15,582	10,512	72	4,866	2,400
15	112,694	23,706	2,880	168	2,130	2,232
16	24,462	45,150	804	900	636	846
17	6,724	20,610	144	864	1,560	1,710
18	26,973	8,598	906	606	2,358	744
19	20,553	3,204	1,344	222	2,256	894
20	10,443	1,668	408	24	1,944	1,068
21	5,040	2,682	474	6	414	882
22	4,365	1,182	522	36	282	234
23	1,623	570	840	6	540	210
24	759	276	438		588	60
25	2,331	180	714		258	78
26	4,404	12	144		222	12
27	1,884	12	48		66	
28	141		60		6	
29	216		144		0	
30	132		126			
Total	825,431	1,240,530	90,036	90,630	203,304	248,700

TABLE 26.--NAKNEK RIVER DAILY RED SALMON ESCAPEMENT COUNTS, 1959-1964

Date	1959	1960	1961	1962	1963	1964
6/21	18					
22	858					42
23	156					234
24	2,688				36	1,602
25	1,182	0		6	60	1,440
26	594	0	11,166	7,122	126	3,036
27	7,437	0	13,044	1,578	1,512	10,794
28	7,113	0	4,044	1,434	24,786	4,710
29	429	582	2,028	10,974	61,968	55,734
30	7,542	8,376	1,296	74,286	10,734	33,828
7/ 1	22,875	89,502	1,218	20,214	93,804	19,788
2	68,895	31,890	1,836	10,956	21,306	4,908
3	177,099	11,322	99,042	20,112	57,864	2,088
4	166,311	20,058	12,258	21,666	43,500	21,222
5	177,054	9,642	17,034	293,712	206,178	212,724
6	132,645	147,228	4,266	128,514	97,116	543,144
7	51,144	95,916	1,674	115,938	52,140	153,768
8	80,364	62,976	5,472	6,024	12,780	44,808
9	119,436	90,828	5,592	2,412	34,572	22,542
10	43,386	36,144	13,668	1,116	50,814	73,128
11	103,233	15,828	34,302	1,182	50,922	22,614
12	460,839	19,698	52,218	1,194	15,246	18,756
13	284,553	20,904	27,228	2,142	11,706	21,786
14	112,880	11,568	10,260	954	24,192	26,274
15	32,440	39,972	3,000	66	9,642	9,744
16	27,036	36,444	5,556	792	9,762	8,070
17	47,244	10,830	8,664	372	2,592	10,980
18	26,136	14,088	5,922	216	3,060	4,188
19	19,132	9,432	684	18	900	5,538
20	6,396	6,810	552	42	654	4,590
21	6,016	6,660	984	24	2,334	3,174
22	6,256	4,092	552		2,178	1,596
23	7,804	3,432	336		1,440	648
24	6,684	2,928	2,748		540	792
25	5,824	2,220	1,674		228	1,002
26	3,432	2,622	462		234	312
27	1,860	2,844	324		210	
28	1,988	2,496	438		90	
29	1,112	2,535	324		102	
30	2,104	2,901	204		30	
31	1,612	1,356	429			
8/ 1		1,194	354			
2		822	84			
3		1,005	141			
4		756				
8/ 5 - 8/19		480				
Total	2,231,807	828,381	351,078	723,066	905,358	1,349,604

TABLE 27.--EGEGIK RIVER DAILY RED SALMON ESCAPEMENT COUNTS, 1959-1964

Date	1959	1960	1961	1962	1963	1964
6/30	4,800	0	0	0	0	0
7/ 1	4,506	-	0	26,394	0	0
2	0	0	11,286	38,604	9,798	204
3	0	0	58,308	76,638	19,266	2,130
4	80	0	17,826	46,206	1,044	24
5	20,348	1,416	17,100	14,124	2,538	10,446
6	15,684	108	49,908	59,994	134,832	12,582
7	98,920	92,346	74,454	182,160	58,122	23,490
8	127,512	62,058	65,562	119,448	55,890	87,180
9	90,436	17,778	119,526	112,512	70,098	89,814
10	96,960	154,728	62,790	79,254	129,444	38,250
11	88,904	193,404	27,414	95,502	18,390	177,408
12	17,152	310,710	22,158	93,972	20,628	134,940
13	2,216	267,738	9,258	15,618	116,922	135,006
14	30,132	68,832	39,228	10,176	200,520	41,766
15	58,544	216,768	9,390	17,856	56,364	48,318
16	86,392	165,102	13,446	26,628	34,416	32,994
17	51,820	137,442	19,626	10,494	13,224	7,764
18	106,704	33,792	18,348	1,482	5,778	5,760
19	21,840	43,890	23,220	270	510	1,320
20	51,152	20,136	17,658	114	186	66
21	25,540	12,108	4,944	36	654	84
22	21,352	402	558	0	246	24
23	8,940	6	2,472	0	1,530	6
24	5,596	0	9,258	0	3,228	
25	1,156	0	3,564	0	4,362	
26	4,624	-	1,404	0	3,888	
27	2,404	0	450	-	786	
28	6,544	0	612	0	26,568	
29	1,412	0	366	0	4,440	
30	741	0	228	0	3,078	
31	48	0	378	0	480	
8/ 1	0	0	294	0	240	
2	0	0	246	0	132	
3	0	0	132	0	0	
4	0	0	126	0	0	
Total	1,072,459	1,798,764	701,538	1,027,482	997,602	849,576

TABLE 28.--UGASHIK RIVER DAILY RED SALMON ESCAPEMENT COUNTS, 1959-1964

Date	1959	1960	1961	1962	1963	1964
7/ 3		0		22,268		0
4		0		606		0
5		0		90		0
6		0	1,110	18	0	0
7		0	1,392	18	78	0
8	0	0	2,328	4,986	66	0
9	2,535	0	9,174	20,460	18	114
10	29,589	0	5,106	9,498	18	0
11	25,845	30	1,560	6,966	12	0
12	20,646	45,672	3,744	5,280	30	77,130
13	12,336	200,282	1,980	1,464	90	71,100
14	5,715	299,628	38,358	144	27,726	47,418
15	2,712	220,122	97,302	18	181,038	33,252
16	19,869	59,250	39,786	133,980	30,804	41,448
17	5,745	38,310	28,962	49,890	23,400	66,192
18	11,277	271,470	24,042	4,662	43,338	24,138
19	16,806	508,176	39,972	2,136	19,482	8,856
20	4,608	216,636	4,050	5,112	13,152	45,876
21	6,477	179,238	10,584	834	11,652	20,334
22	7,701	146,988	9,708	888	4,638	4,476
23	6,192	53,256	10,410	294	1,980	3,084
24	7,707	8,628	5,655	480	4,380	2,142
25	4,460	17,970	3,795	42	6,522	3,720
26	4,984	5,592	930	1,740	1,194	5,784
27	5,508	5,214	726	546	3,048	2,946
28	1,863	7,146	924	228	7,254	2,598
29	1,719	1,842	630	678	6,486	1,290
30	2,213	6,702	1,314	300	1,092	1,656
31	1,335	3,324	1,380	762	636	2,832
8/ 1	2,002	3,012	948	198	78	1,518
2	2,269	2,448	858	360	12	1,818
3	1,655	1,266	468	192	30	642
4	1,393	444	543	84	0	1,572
5	1,521	1,554	153	174		834
6	801		300	30		
7	1,320		285			
8	422		162			
Total	219,228	2,304,200	348,639	255,426	388,254	472,770

TABLE 29.--WOOD RIVER DAILY RED SALMON ESCAPEMENT COUNTS, 1959-1964

Date	1959	1960	1961	1962	1963	1964
6/19		114				
20	57	192			54	24
21	480	96		6	0	390
22	384	132		162	30	426
23	996	211		84	684	390
24	1,452	512		96	2,382	324
25	1,176	1,296	30	228	2,166	594
26	3,048	10,013	1,104	1,866	984	1,710
27	16,986	8,208	4,224	1,014	1,386	5,328
28	105,984	4,116	2,874	786	5,868	8,220
29	82,752	4,770	2,805	1,662	6,414	8,076
30	62,148	1,488	3,006	1,056	5,628	8,004
7/ 1	84,978	1,443	96	1,956	4,410	1,908
2	115,782	1,830	9,030	2,094	4,512	426
3	340,752	5,844	15,438	90,558	3,114	480
4	201,930	2,826	24,594	112,296	1,248	5,538
5	184,734	6,474	23,433	248,742	220,698	94,560
6	163,254	98,460	30,588	230,274	263,328	100,830
7	85,086	232,140	30,474	54,960	15,924	31,842
8	29,730	199,596	21,510	23,022	13,464	22,386
9	23,802	167,094	16,728	23,922	17,070	166,188
10	23,292	103,746	30,924	24,036	20,634	210,990
11	13,698	41,190	26,022	8,562	63,768	275,520
12	116,058	15,600	75,009	7,512	17,724	67,656
13	250,602	13,188	77,736	3,420	13,050	23,658
14	129,270	15,708	43,734	1,944	12,822	10,878
15	52,248	16,728	8,250	4,554	5,340	9,864
16	13,788	17,418	5,682	12,288	4,134	4,008
17	11,334	16,872	3,492	3,552	4,320	4,974
18	24,612	9,120	1,209	714	2,250	2,508
19	27,738	6,444	1,176	462	1,830	1,890
20	13,242	4,392	507	666	876	1,710
21	5,976	1,524	186	480	1,536	1,152
22	4,698	1,376	0	324	1,200	966
23	3,912	368	24	978	1,044	480
24	4,266	760	54	1,116	492	498
25	1,515	2,312	486	726	306	396
26	2,631	1,920	186	696	246	222
27	912	552	54	534	126	108
28	1,575		54	1,920	102	990
29	552		18	3,726	54	
30	36			708	180	
31	1,836			114	6	
8/ 1				72		
Total	2,209,266	1,016,073	460,737	873,888	721,404	1,076,112

TABLE 30.--IGUSHIK RIVER DAILY RED SALMON ESCAPEMENT COUNTS, 1959-1964

Date	1959	1960	1961	1962	1963	1964
6/22	492			0		0
23	897		192	0		0
24	804		144	0		0
25	1,725	0	162	0	36	0
26	1,110	30	108	0	0	0
27	1,416	48	348	0	0	0
28	1,593	726	1,812	0	0	12
29	4,281	4,008	5,880	0	48	12
30	9,561	9,048	9,234	204	480	36
7/ 1	10,977	2,892	12,270	306	252	930
2	17,280	4,452	14,220	312	798	168
3	28,878	6,747	16,548	564	1,362	9,510
4	32,538	8,196	14,070	348	2,364	5,706
5	38,754	11,370	18,516	546	1,860	3,264
6	55,998	14,442	20,556	708	2,286	3,870
7	38,034	13,878	21,030	2,286	8,328	7,980
8	35,796	14,352	26,946	3,762	11,982	12,972
9	45,915	18,702	20,568	2,628	14,850	13,206
10	37,461	34,674	17,946	1,752	12,300	9,174
11	31,578	34,812	17,886	720	7,230	7,104
12	29,889	45,426	13,980	834	4,392	9,102
13	15,042	42,780	11,520	372	3,276	5,646
14	11,418	31,314	10,038	90	3,036	5,916
15	19,893	25,434	10,212	42	2,700	10,212
16	20,475	20,064	5,760	42	2,604	7,878
17	16,257	11,892	6,138	54	4,080	4,110
18	21,822	17,322	3,564	72	2,196	4,242
19	23,571	16,686	2,730	6	1,584	2,646
20	22,644	13,872	1,884	0	1,728	1,818
21	18,861	13,080	2,130	0	978	882
22	15,906	12,642	1,002	12	570	1,236
23	6,129	12,108	1,146	0	300	636
24	5,520	11,958	36		270	210
25	3,719	8,628	684		102	6
26	2,961	6,582	1,110		150	36
27	1,206	6,156	540		36	12
28	4,635	3,930	390		6	
29	2,946	4,152	630			
30	1,706	3,384	444			
31	1,734	2,094	756			
8/ 1	1,069	2,340	414			
2	360	1,590	558			
3	957	1,296	150			
4		1,260				
5		720				
Total	643,808	495,087	294,252	15,660	92,184	128,532

TABLE 31.--SNAKE RIVER DAILY RED SALMON ESCAPEMENT COUNTS, 1960-1964

Date	1960	1961	1962	1963	1964
6/24	0				
25	0		0		
26	0		0		0
27	81	0	0		0
28	75	0	0		0
29	0	30	0		0
30	54	0	8	136	0
7/ 1	0	0	4	40	0
2	24	6	0	28	0
3	0	0	0	2,584	0
4	52	0	0	2,044	0
5	0	0	36	728	0
6	144	0	80	1,732	0
7	336	0	40	6,796	1,492
8	1,124	0	40	11,980	1,224
9	2,824	312	424	3,328	144
10	3,140	32	580	1,580	460
11	2,368	8	24	1,000	672
12	1,408	44	60	484	1,936
13	1,024	760	84	1,504	2,060
14	840	1,792	60	1,720	524
15	472	584	8	408	1,948
16	564	464	48	68	892
17	236	192	72	84	24
18	32	308	52	1,044	468
19	924	112	36	56	364
20	500	108	32	228	120
21	264	0	12	216	20
22	84	0	20	100	56
23	20	28	32	40	20
24	8	12	8	20	12
25	0	8	0	12	
26		4	0	0	
27		52			
28		0			
Total	16,598	4,856	1,760	37,960	12,436

Aerial survey estimate in 1959 of 139,950

TABLE 32.--NUYAKUK RIVER DAILY RED SALMON ESCAPEMENT COUNTS, 1959-1964

Date	1959	1960	1961	1962	1963	1964
7/ 3					390	
4					1,140	
5	498				1,788	
6	492				2,862	
7	2,442	144	1,896	942	2,184	
8	3,363	594	9,192	2,148	870	102
9	3,213	888	10,698	1,740	23,490	384
10	5,637	1,848	7,044	1,752	47,016	2,316
11	6,321	8,430	6,864	6,582	40,116	3,864
12	3,597	37,290	3,462	7,098	17,472	8,754
13	3,849	38,952	2,544	5,844	7,398	7,968
14	2,526	28,830	5,508	3,600	3,786	16,806
15	2,208	12,330	6,150	3,372	9,468	27,438
16	1,656	4,896	4,980	1,866	2,940	22,512
17	930	5,328	6,642	834	1,566	6,588
18	384	3,636	5,922	996	1,116	1,440
19	399	1,488	3,840	414	588	912
20	1,533	300	2,088	324	738	768
21	1,485	156	756	120	510	762
22	1,344	78	426	42	222	288
23	1,371	18	372	42	252	108
24	1,326	0	354	18	66	48
25	675	0	222	24	126	108
26	639	6	162	24	90	210
27	411	6	114	12	132	318
28	381	12	150	12	114	192
29	411	36	138	18	102	168
30	249	0	66	6	54	84
31	291	12	66	12	12	180
8/ 1	324	18	84	6		78
2	354	36	48	12		12
3	225	0		0		96
4	117	6		6		102
5	96	0		6		60
6	114	0		0		96
7		0		6		72
8		0		0		66
9		12		0		132
10		36		0		84
11		30		0		108
12		0		0		
13		6		12		
		78*				
Total	48,861	145,500	79,788	37,890	166,608	103,224

* Late season escapement counts

TABLE 33.--NUYAKUK RIVER DAILY PINK SALMON ESCAPEMENT COUNTS, 1960-1964[1/]

Date	1960	1962	1964
7/ 8	0		0
9	0		0
10	0		0
11	0		0
12	0		0
13	0		0
14	0		0
15	0		30
16	0	702	570
17	0	1,488	1,410
18	672	2,268	1,476
19	1,434	1,884	2,910
20	1,991	22,572	5,478
21	2,262	59,526	9,438
22	1,143	46,734	11,784
23	747	10,506	8,652
24	639	46,878	2,562
25	840	25,824	4,212
26	543	12,858	13,074
27	1,290	10,674	48,960
28	1,563	19,416	52,974
29	3,306	50,382	54,684
30	2,181	68,678	68,748
31	2,367	29,706	82,086
8/ 1	2,073	10,554	66,726
2	7,098	6,588	56,940
3	2,196	2,646	94,680
4	2,121	6,078	50,148
5	18,372	7,164	21,738
6	3,213	10,674	22,824
7	7,914	10,650	228
8	4,439	3,906	7,248
9	3,942	1,764	28,284
10	11,736	1,360	10,368
11	19,005	5,076	15,252
12	8,079	7,374	
13	13,398	2,202	
14	5,040	1,680	
15	5,181	1,566	
16	2,406	1,386	
17	2,580	750	
18	2,922	462	
19	1,692	732	
20	1,116	588	
21	810	618	
22	48		
Total	146,359	493,914	743,484

1/ Even year runs only

TABLE 34.--TOGIAK RIVER DAILY RED SALMON ESCAPEMENT COUNTS, 1960-1964

Date	1960	1961	1962	1963	1964
7/ 3		0	0		
4		42	6		
5		84	54		
6		0	156		
7		876	66	120	
8	0	1,050	492	1,164	
9	219	3,348	1,026	2,220	42
10	3,738	4,818	972	4,914	1,338
11	4,875	4,194	2,448	10,206	1,338
12	6,234	3,696	3,486	12,582	3,120
13	7,728	3,294	5,334	4,554	1,602
14	8,739	4,374	3,720	5,376	3,534
15	7,281	5,736	3,240	3,702	4,818
16	7,680	6,162	2,478	1,266	3,822
17	6,852	4,176	2,568	3,630	1,056
18	5,190	3,078	2,754	3,972	2,496
19	7,050	3,942	2,868	3,474	3,078
20	6,366	6,126	948	6,066	2,136
21	5,862	5,874	510	3,180	2,448
22	5,112	3,084	804	1,998	4,770
23	5,346	2,328	1,290	2,460	9,210
24	5,190	1,164	942	2,874	7,998
25	4,680	1,368	414	3,912	3,702
26	2,598	1,686	546	3,822	2,922
27	3,672	2,208	1,626	1,788	2,394
28	4,422	2,970	1,092	1,026	1,980
29	6,510	4,098	1,470	1,968	1,704
30	5,004	2,484	738	954	4,824
31	3,378	1,662	144	4,386	4,428
8/ 1	1,608	1,380	432	4,104	3,252
2	3,522	966	324	2,328	3,804
3	5,418	2,166	564	1,788	1,866
4	5,244	1,866	708	1,074	2,292
5	5,070	1,134	396	630	1,416
6	4,926	1,638	72	264	1,626
7	4,710	786	384	102	1,374
8	3,300	282	336	48	948
9	2,088	504	384	54	1,164
10	1,878	144	240	264	858
11	1,320	252	510	126	456
12		192	216		540
13		222	378		366
14			120		252
15			84		276
16			0		228
17			12		96
Total	162,810	95,454	47,352	102,396	95,574

Aerial survey estimate in 1959 of 178,740

TABLE 35.--COMPARATIVE RED SALMON ESCAPEMENT COUNTS BY RIVER SYSTEM, 1959-1964

River	1959	1960	1961	1962	1963	1964
Kvichak River	680,000	14,630,000	3,705,849	2,580,884	338,760	957,120
Branch River	825,431	1,240,530	90,036	90,630	203,304	248,700
Naknek River	2,231,807	828,381	351,078	723,066	905,358	1,349,604
Egegik River	1,072,459	1,798,764	701,538	1,027,482	997,602	849,576
Ugashik River	219,228	2,304,200	348,639	255,426	388,254	472,770
Mother Goose System	--	37,200 1/	17,800 1/	18,600 1/	8,750 1/	10,000 1/
Wood River	2,209,266	1,016,073	460,737	873,888	721,404	1,076,112
Igushik River	643,808	495,087	294,252	15,660	92,184	128,532
Snake River	139,950 1/	16,598	4,856	1,760	37,960	12,436
Nuyakuk River	48,861	145,500	79,788	37,890	166,608	103,224
Nushagak-Mulchatna System	--	--	20,000 1/	8,500 1/	45,700 1/	10,800 1/
Togiak River	178,740 1/	162,810	95,454	47,352	102,396	95,574
Togiak Tributaries	30,900 1/	29,200 1/	26,800 1/	14,600 1/	13,800 1/	4,100 1/
Kulukak System	--	--	5,200 1/	9,600 1/	11,400 1/	4,400 1/
Total Escapement	8,280,450	22,704,343	6,202,027	5,705,338	4,033,480	5,322,948

1/ Aerial survey estimate

Source of Data

Fisheries Research Institute, University of Washington; U. S. Bureau of Commercial Fisheries; Alaska Department Fish and Game, Commercial Fisheries Division

TABLE 36.--COMPARATIVE BRISTOL BAY RED SALMON ESCAPEMENT IN NUMBERS OF FISH BY DISTRICT, 1951-1964

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1951	-	-	205,881	539,600	51,000	796,481
1952	-	756,921	651,209	433,800	102,000	1,943,930
1953	-	519,098	1,056,361	828,542	102,000	2,506,001
1954	-	507,298	458,635	691,624	77,000	1,734,557
1955	529,046	271,039	76,982	1,933,755	112,000	2,922,822
1956	11,215,913	1,104,230	425,295	1,212,101	225,000	14,182,539
1957	3,604,050	391,207	214,802	498,727	25,000	4,733,786
1958	907,553	246,354	279,546	1,277,933	72,000	2,783,386
1959	3,737,238	1,072,459	219,228	3,041,885	209,640	8,280,450
1960	16,698,911	1,798,764	2,341,400	1,673,258	192,010	22,704,343
1961	4,146,963	701,538	366,439	859,633	127,454	6,202,027
1962	3,394,580	1,027,482	274,026	937,698	71,552	5,705,338
1963	1,447,422	997,602	397,004	1,063,856	127,596	4,033,480
1964	2,555,424	849,576	482,770	1,331,104	104,074	5,322,948
14 year average	4,823,710 1/	787,967 2/	532,113 3/	1,165,965	114,166 4/	7,687,112 5/

1/ 10 year average for Naknek-Kvichak system. 1955-56 includes only Kvichak and Naknek Rivers

2/ 13 year average for Egegik system

3/ Includes Mother Goose system beginning in 1960

4/ 1951-1953 and 1956-1958 includes Togiak Lakes only. 1954-1955 includes only Ongivinuk system and 1959 to date includes all Togiak tributaries. Kulukak system included 1961 to date

5/ 10 year average, 1955 through 1964

Source of Data

Statistical Records and Computations on Red Salmon Runs to the Nushagak District, 1946-1959, by Fisheries Research Institute, University of Washington

Tabulated Information on Red Salmon Runs to the Ugashik System, 1946-1957. Circular No. 184, by Fisheries Research Institute, University of Washington

Annual Reports for Bristol Bay, 1951-1959, by Fishery Management Agents, U. S. Bureau of Commercial Fisheries

Comparison of Escapements to the Togiak Lakes System in 1954 and 1955, by Fisheries Research Institute, University of Washington, (Interdepartmental report)

Alaska Department Fish and Game, Commercial Fisheries Division, 1960-1964 by Bristol Bay Area Staff

TABLE 37.-- SUMMARY OF BRISTOL BAY RED SALMON CATCH & ESCAPEMENT, 1964[1/]

	Escapement System	Escapement District	Catch	Total Run
N-K District:				
Kvichak River	957,120		763,486	1,720,606
Naknek River	1,349,604		1,206,332	2,555,936
Alagnak River	248,700		273,883	522,583
		2,555,424	2,243,701	4,799,125
Nushagak District:				
Wood River	1,076,112		1,075,263	2,151,375
Igushik River	128,532		190,467	318,999
Snake River	12,436		14,613	27,049
Tikchik Lakes	103,224		140,598	254,622
Nush-Mulchatna System	10,800			
		1,331,104	1,420,941	2,752,045
Egegik:		849,576	1,103,935	1,953,511
Ugashik District:				
Ugashik Lakes	472,770			
Mother Goose System	10,000			
		482,770	576,768	1,059,538
Togiak District:				
Togiak River	95,574			
Togiak Tributaries	4,100			
Kulukak System	4,400			
		104,074	250,775	354,849
Total Bristol Bay		5,322,948	5,596,120	10,919,068

1/ Final corrected catch and escapement figures are given

Source of Data
Alaska Department Fish and Game, Commercial Fisheries Division, Bristol Bay

TABLE 38.--CATCH AND ESCAPEMENT OF RED SALMON
IN THE NAKNEK-KVICHAK DISTRICT BY RIVER SYSTEM, 1955-1964

Year	Escapement by River System				Catch	Total Return
	Kvichak	Branch	Naknek	Total		
1955	250,546	-	278,500	529,046	2,564,341	3,093,387
1956	9,443,318	-	1,772,595	11,215,913	5,987,750	17,203,663
1957	2,842,810	126,595	634,645	3,604,050	4,578,643	8,182,693
1958	534,785	94,650	278,118	907,553	922,611	1,830,164
1959	680,000	825,431	2,231,807	3,737,238	1,689,425	5,426,663
1960	14,630,000	1,240,530	828,381	16,698,911	9,847,848	26,546,759
1961	3,705,849	90,036	351,078	4,146,963	8,166,983	12,313,946
1962	2,580,884	90,630	723,066	3,394,580	2,281,284	5,675,864
1963	338,760	203,304	905,358	1,447,422	957,902	2,405,324
1964	957,120	248,700	1,349,604	2,555,424	2,271,694 2/	4,827,118
10 year average	3,596,407	364,985 1/	935,315	4,823,710	3,926,848	8,750,558

1/ 8 year average for Branch River system

2/ Preliminary catch data

Source of Data

Statistical Yearbooks, 1952-1961, International North Pacific Fisheries Commission

Annual Reports for Bristol Bay, 1951-1959, by Fishery Management Agents, U. S. Bureau of Commercial Fisheries

Alaska Department Fish and Game, Commercial Fisheries Division, Bristol Bay, 1960-1964

TABLE 39.--CATCH AND ESCAPEMENT OF RED SALMON
IN THE EGEGIK AND UGASHIK DISTRICTS BY RIVER SYSTEM, 1951-1964

Year	Egegik District			Ugashik District				
	Escapement	Catch	Total Return	Escapement			Catch	Total Return
	Egegik			Ugashik	Mother Goose	Total		
1951		644,551	--	205,881	--	205,881	318,629	524,510
1952	756,921	886,852	1,643,773	651,209	--	651,209	280,146	931,355
1953	519,098	1,234,600	1,753,698	1,056,361	--	1,056,361	688,720	1,745,081
1954	507,298	1,437,791	1,945,089	458,635	--	458,635	1,067,531	1,526,166
1955	271,039	622,885	893,924	76,982	--	76,982	240,817	317,799
1956	1,104,230	1,187,108	2,291,338	425,295	--	425,295	341,499	766,794
1957	391,207	814,459	1,205,666	214,802	--	214,802	350,858	565,660
1958	246,354	500,684	747,038	279,546	--	279,546	433,813	713,359
1959	1,072,459	662,391	1,734,850	219,228	--	219,228	423,414	642,642
1960	1,798,764	1,446,884	3,245,648	2,304,200	37,200	2,341,400	752,634	3,094,034
1961	701,538	2,686,076	3,387,614	348,639	17,300	366,439	357,223	723,662
1962	1,027,482	638,862	1,666,344	255,426	18,600	274,026	243,159	517,185
1963	997,602	695,558	1,693,160	388,254	8,750	397,004	188,695	585,699
1964	849,576	937,720 2/	1,787,296	472,770	10,000	482,770	582,159 2/	1,064,929
14 year average	787,967 1/	1,028,318	1,845,803 1/	525,516	18,470 3/	532,113	447,807	979,920

1/ 13 year average for Egegik River system
2/ Preliminary catch data
3/ 5 year average for Mother Goose River system

Source of Data
Statistical Yearbooks, 1952-1961, International North Pacific Fisheries Commission
Annual Reports for Bristol Bay, 1951-1959, by Fishery Management Agents, U. S. Bureau Commercial Fisheries
Tabulated Information on Red Salmon Runs to the Ugashik system, 1946-1957, Circular No. 184, by Fisheries Research Institute, University of Washington; Alaska Department Fish and Game, Commercial Fisheries Division, Bristol Bay 1960-1964

TABLE 40.--CATCH AND ESCAPEMENT OF RED SALMON
IN THE NUSHAGAK DISTRICT BY RIVER SYSTEM, 1951-1964

Year	Escapement by River System						Catch	Total Return
	Wood	Igushik	Snake	Nuyakuk	Nushagak-Mulchatna	Total		
1951	457,600	40,000	3,000	39,000	--	539,600	436,950	976,550
1952	226,800	150,000	4,000	38,000	15,000	433,800	698,071	1,131,871
1953	515,542	100,000	4,000	189,000	20,000	828,542	449,341	1,277,883
1954	570,624	80,000	4,000	29,000	8,000	691,624	315,357	1,006,981
1955	1,382,755	500,000	30,000	16,000	5,000	1,933,755	1,054,978	2,988,733
1956	773,101	400,000	4,000	30,000	5,000	1,212,101	1,263,186	2,475,287
1957	288,727	130,000	3,000	67,000	10,000	498,727	491,498	990,225
1958	960,455	107,478	9,000	196,000	5,000	1,277,933	1,092,156	2,370,089
1959	2,209,266	643,808	139,950	48,861	--	3,041,885	1,719,687	4,761,572
1960	1,016,073	495,087	16,598	145,500	--	1,673,258	1,517,988	3,191,246
1961	460,737	294,252	4,856	79,788	20,000	859,633	511,483	1,371,116
1962	873,888	15,660	1,760	37,890	8,500	937,698	1,461,766	2,399,464
1963	721,404	92,184	37,960	166,608	45,700	1,063,856	842,744	1,906,600
1964	1,076,112	128,532	12,436	103,224	10,800	1,331,104	1,380,314[2/]	2,711,418
14 year average	823,935	226,929	19,611	84,705	13,909[1/]	1,165,965	945,394	2,111,360

1/ 11 year average for Nushagak-Mulchatna River system
2/ Preliminary catch data

Source of Data

Statistical Records and Computations on Red Salmon Runs to the Nushagak District, 1946-1959, by Fisheries Research Institute, University of Washington; Alaska Department Fish and Game, Commercial Fisheries Division, Bristol Bay, 1960-1964

TABLE 41.--CATCH AND ESCAPEMENT OF RED SALMON
IN THE TOGIAK DISTRICT BY RIVER SYSTEM, 1951-1964

Year	Escapement by River System				Catch	Total Return
	Togiak	Tributaries	Kulukak	Total		
1951	51,000	--	--	51,000	--	51,000
1952	102,000	--	--	102,000	--	102,000
1953	102,000	--	--	102,000	--	102,000
1954	57,000	20,000	--	77,000	12,280	89,280
1955	104,000	8,000	--	112,000	66,085	178,085
1956	225,000	--	--	225,000	101,933	326,933
1957	25,000	--	--	25,000	40,044	65,044
1958	72,000	--	--	72,000	36,402	108,402
1959	178,740	30,900	--	209,640	113,202	322,842
1960	162,810	29,200	--	192,010	139,648	331,658
1961	95,454	26,800	5,200	127,454	192,161	319,615
1962	47,352	14,600	9,600	71,552	92,945	164,497
1963	102,396	13,800	11,400	127,596	186,283	313,879
1964	95,574	4,100	4,400	104,074	267,099 3/	371,173
14 year average	101,452	19,567 1/	7,650 2/	114,166	113,456 4/	203,315

1/ 6 year average, 1959-1964, for Togiak tributaries
2/ 4 year average for Kulukak River system
3/ Preliminary catch data
4/ 11 year average

Source of Data

Alaska Commercial Salmon Catch Statistics, 1951-1959, Statistical Digest No. 50, U. S. Bureau of Commercial Fisheries; Comparison of Escapements to the Togiak Lakes System in 1954 & 1955, by Fisheries Research Institute, University of Washington (Interdepartmental Report); Alaska Department Fish and Game, Commercial Fisheries Division, Bristol Bay, 1960-1964

TABLE 42--TOTAL BRISTOL BAY RETURN OF RED SALMON BY DISTRICT, 1951-1964

Year	Catch and Escapement by District					Total Bristol Bay Return
	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	
1951	--	--	524,510	976,550	51,000	--
1952	--	1,643,773	931,355	1,131,871	102,000	--
1953	--	1,753,698	1,745,081	1,277,883	102,000	--
1954	--	1,945,089	1,526,166	1,006,981	89,280	--
1955	3,093,387	893,924	317,799	2,988,733	178,085	7,471,928
1956	17,203,663	2,291,338	766,794	2,475,287	326,933	23,064,015
1957	8,182,693	1,205,666	565,660	990,225	65,044	11,009,288
1958	1,830,164	747,038	713,359	2,370,089	108,402	5,769,052
1959	5,426,663	1,734,850	642,642	4,761,572	322,842	12,888,569
1960	26,546,759	3,245,648	3,094,034	3,191,246	331,658	36,409,345
1961	12,313,946	3,387,614	723,662	1,371,116	319,615	18,115,983
1962	5,675,864	1,666,344	517,185	2,399,464	164,497	10,423,354
1963	2,405,324	1,693,160	585,699	1,906,600	313,879	6,904,662
1964	4,827,118	1,787,296	1,064,929	2,711,418	371,173	10,761,934
14 year average	8,750,558[1/]	1,845,803[2/]	979,920	2,111,360	203,315	14,281,813[1/]

1/ 10 year average
2/ 13 year average

Source of Data

Statistical Yearbooks, International North Pacific Fisheries Commission
U. S. Bureau of Commercial Fisheries
Fisheries Research Institute, University of Washington
Alaska Department Fish and Game, Commercial Fisheries Division

TABLE 43 :--PRELIMINARY SEX COMPOSITION OF BRISTOL BAY RED SALMON RUN, 1964

District	Percent		Number of Fish		
	Males	Females	Males	Females	Total
NAKNEK-KVICHAK					
Kvichak River Escapement	58.26	41.74	557,657	399,463	957,120
Branch River Escapement	38.21	61.79	95,031	153,669	248,700
Naknek River Escapement	41.66	58.34	562,249	787,355	1,349,604
Catch	53.85	46.15	1,223,307	1,048,387	2,271,694
SYSTEM TOTAL	50.51	49.49	2,438,290	2,388,874	4,827,118
EGEGIK					
Egegik River Escapement	46.16	53.84	392,166	457,410	849,576
Catch	51.18	48.82	479,925	457,795	937,720
SYSTEM TOTAL	48.79	51.21	872,091	915,205	1,787,296
UGASHIK[1/]					
Ugashik River Escapement	44.53	55.47	210,503	262,267	472,770
Catch	59.73	40.27	347,724	234,435	582,159
SYSTEM TOTAL	52.92	47.08	558,227	496,702	1,054,929
NUSHAGAK[2/]					
Wood River Escapement	38.69	61.31	416,298	659,814	1,076,112
Igushik River Escapement	35.91	64.09	46,157	82,375	128,532
Snake River Escapement	53.49	46.51	6,652	5,784	12,436
Nuyakuk River Escapement	45.39	54.61	46,856	56,368	103,224
Catch	49.9	50.10	688,777	691,537	1,380,314
SYSTEM TOTAL	44.61	55.39	1,204,740	1,495,878	2,700,618
TOGIAK[3/]					
Togiak River Escapement	52.53	47.47	50,205	45,369	95,574
Catch	49.09	50.91	131,119	135,980	267,099
SYSTEM TOTAL	50.00	50.00	181,324	181,349	362,673
BRISTOL BAY					
Escapement	45.03	54.97	2,396,923	2,926,025	5,322,948
Catch	52.71	47.29	2,866,890	2,572,096	5,438,986
TOTAL BAY RETURN	48.91	51.09	5,263,813	5,498,121	10,761,934

1/ Mother Goose River system escapement not included
2/ Nushagak-Mulchatna River system not included
3/ Togiak tributaries and Kulukak River system not included

Source of Data

Alaska Department Fish and Game, 1964 Division of Biological Research

TABLE 44.--NAKNEK-KVICHAK DISTRICT RED SALMON CATCH[1/] AND ESCAPEMENT BY AGE GROUP, 1964

System	0.2 (3_1)	1.1 (3_2)	0.3 (4_1)	1.2 (4_2)	2.1 (4_3)	1.3 (5_2)	2.2 (5_3)	1.4 (6_2)	2.3 (6_3)	3.2 (6_4)	3.3 (7_4)	Totals
KVICHAK RIVER												
Escapement	158	372	95	669,907	126,165	45,106	104,705	---	10,612	---	---	957,120
Catch	690	---	1,048	592,300	4,904	63,982	94,116	86	13,939	---	1,885	772,950
Subtotal	848	372	1,143	1,262,207	131,069	109,088	198,821	86	24,551	---	1,885	1,730,070
Percent	0.05	0.02	0.07	72.96	7.58	6.30	11.49	0.00	1.42	---	0.11	100.00
BRANCH RIVER												
Escapement	---	9,778	---	53,354	---	102,927	62,547	---	20,094	---	---	248,700
Catch	---	---	---	47,174	---	145,307	55,321	22	28,620	---	490	276,934
Subtotal	---	9,778	---	100,528	---	248,234	117,868	22	48,714	---	490	525,634
Percent	---	1.86	---	19.13	---	47.23	22.42	0.00	9.27	---	0.09	100.00
NAKNEK RIVER												
Escapement	---	244	309	760,096	8,748	135,002	376,104	309	67,940	852	---	1,349,604
Catch	---	---	173	591,773	315	193,570	340,096	122	90,760	2,342	2,659	1,221,810
Subtotal	---	244	482	1,351,869	9,063	328,572	716,200	431	158,700	3,194	2,659	2,571,414
Percent	---	0.01	0.02	52.58	0.35	12.78	27.85	0.02	6.17	0.12	0.10	100.00
TOTAL NAKNEK-KVICHAK												
Escapement	158	10,394	404	1,483,357	134,913	283,035	543,356	309	98,646	852	---	2,555,424
Catch	690	---	1,221	1,231,247	5,219	402,859	489,533	230	133,319	2,342	5,034	2,271,694
Subtotal	848	10,394	1,625	2,714,604	140,132	685,894	1,032,889	539	231,965	3,194	5,034	4,827,118
Percent	0.02	0.22	0.03	56.24	2.90	14.21	21.40	0.01	4.80	0.07	0.10	100.00

1/ Preliminary data

Source of Data

Alaska Department Fish and Game, 1964, Division of Biological Research

TABLE45.--EGEGIK DISTRICT RED SALMON CATCH[1/] AND ESCAPEMENT BY AGE GROUP, 1964

	1.1 3_2	1.2 4_2	2.1 4_3	1.3 5_2	2.2 5_3	3.1 5_4	2.3 6_3	3.2 6_4	3.3 7_4	Totals
Escapement	377	166,512	20,302	46,131	483,858	---	110,577	5,540	16,279	849,576
Catch	---	224,738	388	91,408	427,107	431	150,139	8,087	35,422	937,720
Subtotal	377	391,250	20,690	137,539	910,965	431	260,716	13,627	51,701	1,787,296
Percent	0.02	21.89	1.16	7.70	50.97	0.02	14.59	0.76	2.89	100.00

TABLE 46.--UGASHIK DISTRICT RED SALMON CATCH[1/] AND ESCAPEMENT BY AGE GROUP, 1964

	1.1 3_2	0.3 4_1	1.2 4_2	2.1 4_3	1.3 5_2	2.2 5_3	2.3 6_3	3.3 7_4	Totals
Escapement	53	---	321,674	10,240	5,064	120,758	14,981	---	472,770[2/]
Catch	489	338	317,220	254	31,697	181,035	49,520	1,606	582,159
Subtotal	542	338	638,894	10,494	36,761	301,793	64,501	1,606	1,054,929
Percent	0.05	0.03	60.56	0.99	3.49	28.61	6.12	0.15	100.00

1/ Preliminary data

2/ Mother Goose River system not included

Source of Data

Alaska Department Fish and Game, 1964 Division of Biological Research

TABLE 47 .--NUSHAGAK DISTRICT RED SALMON CATCH[1/] AND ESCAPEMENT BY AGE GROUP, 1964

System	0.2 3_1	0.3 4_1	1.2 4_2	2.1 4_3	0.4 5_1	1.3 5_2	2.2 5_3	2.3 6_3	Totals
WOOD RIVER									
Escapement	105	---	792,509	61	----	127,610	147,208	8,619	1,076,112
Catch	73	---	594,217	81	108	237,560	190,870	21,040	1,043,949
Subtotal	178	---	1,386,726	142	108	365,170	338,078	29,659	2,120,061
Percent	0.01	---	65.41	0.01	0.00	17.22	15.95	1.40	100.00
IGUSHIK RIVER									
Escapement	---	98	32,945	---	---	49,733	38,292	7,464	128,532
Catch	---	2,786	24,493	9	13	93,171	47,379	17,469	185,320
Subtotal	---	2,884	57,438	9	13	142,904	85,671	24,933	313,852
Percent	---	0.92	18.30	0.00	0.00	45.54	27.30	7.94	100.00
SNAKE RIVER									
Escapement	---	---	7,490	---	---	2,313	2,575	58	12,436
Catch	---	---	6,051	1	1	4,407	3,605	161	14,226
Subtotal	---	---	13,541	1	1	6,720	6,180	219	26,662
Percent	---	---	50.79	0.00	0.00	25.21	23.18	0.82	100.00
NUYAKUK RIVER									
Escapement	597	1,173	78,879	---	---	18,372	1,144	3,059	103,224
Catch	1,704	29,288	62,433	8	10	34,511	1,453	7,412	135,819
Subtotal	2,301	30,461	141,312	8	10	52,883	2,597	10,471	240,043
Percent	0.96	12.69	58.87	0.00	0.00	22.03	1.08	4.37	100.00
TOTAL NUSHAGAK									
Escapement	702	1,271	911,823	61	---	198,028	189,219	19,200	1,320,304[2/]
Catch	1,777	32,074	687,194	99	132	369,649	243,307	46,082	1,380,314
Subtotal	2,479	33,345	1,599,017	160	132	567,677	432,526	65,282	2,700,618
Percent	0.09	1.23	59.21	0.01	0.00	21.02	16.02	2.42	100.00

1/ Preliminary data

2/ Nushagak-Mulchatna River system not included

Source of Data
Alaska Department Fish and Game, 1964 Division of Biological Research

TABLE 48.--TOGIAK DISTRICT RED SALMON CATCH[1/] AND ESCAPEMENT BY AGE GROUP, 1964

	0.2 (3_1)	1.1 (3_2)	0.3 (4_1)	1.2 (4_2)	1.3 (5_2)	2.2 (5_3)	2.3 (6_3)	Total
Escapement	557	52	10	65,064	15,832	10,416	3,643	95,574[2/]
Catch	273	--	2,398	123,804	75,615	44,507	20,502	267,099
Subtotal	830	52	2,408	188,868	91,447	54,923	24,145	362,673
Percent	0.23	0.01	0.66	52.08	25.22	15.14	6.66	100.00

1/ Preliminary data

2/ Togiak tributaries and Kulukak River system not included

Source of Data
Alaska Department Fish and Game, 1964 Division of Biological Research

TABLE 49.--COMPARATIVE AGE, LENGTH AND INDEX NET CATCHES OF RED SALMON SMOLT FROM THE KVICHAK RIVER SYSTEM, 1955-1964*

Year of Seaward Migration	Age I[1] Percent	Age I[1] Mean Length in mm	Age II[1] Percent	Age II[1] Mean Length in mm	Index[3] Points	Index[4] Net Catch
1955	7.3	89.0	92.7	109.0	11.2	213,684
1956	39.2	92.0	60.8	116.0	3.3	63,886
1957	72.3	96.0	27.7	120.0	1.3	25,424
1958[2]	97.9	84.0	2.1	114.0	100.0	1,912,767
1959	2.9	80.0	97.1	99.0	85.9	1,643,073
1960	10.0	91.0	90.0	108.0	23.8	454,783
1961	72.2	91.8	27.8	117.2	1.6	29,750
1962	94.0	82.0	6.0	110.0	15.8	301,413
1963	2.7	83.3	97.3	98.3	72.2	1,380,803
1964[5]	22.0	86.5	78.0	107.8	41.3	790,542
Average	42.1	87.6	57.9	109.9	15.4[6]	618,613

* Age and length weighted by index net catch
1/ Number winters in freshwater
2/ Base year: assigned value of 100.0
3/ One index point = 19,127.67 smolts
4/ Three hour index period, 10 p.m. to 1 a.m.
5/ Preliminary data
6/ Geometric mean

Source of Data

Alaska Department Fish and Game, Commercial Fisheries Division, Bristol Bay, 1961 and 1963-1964

Fisheries Research Institute, University of Washington, 1955-1960 and 1962

TABLE 50.--COMPARATIVE AGE, LENGTH, INDEX NET CATCHES AND OUTMIGRATION ESTIMATES OF RED SALMON SMOLT FROM THE UGASHIK RIVER SYSTEM, 1956-1964*

Year of Seaward Migration	Age I[1]		Age II[1]		Index[3]	Index[4]	
	Percent	Mean Length in mm	Percent	Mean Length in mm	Points	Net Catch	Outmigration Estimate
1956	11.0	--	89.0	--	--	--	--
1957	4.0	--	96.0	--	--	--	--
1958[2]	98.1	93.0	1.9	112.0	100.0	301,232	11,659,905
1959	87.3	90.0	12.7	120.0	36.5	109,982	2,887,002
1960	59.7	90.0	39.3	108.0	75.1	226,317	5,503,646
1961	20.4	90.0	79.6	112.0	52.3	157,441	3,802,079
1962	80.7	88.0	19.3	112.0	103.1	310,616	16,692,089
1963	46.3	89.8	53.7	104.3	305.2	919,451	33,750,496
1964	80.1	92.2	19.8	118.3	68.1	205,145	9,990,048
Average	54.2	90.4	45.7	112.4	84.5[5]	318,598	12,040,752

* Age and length weighted by index net catch
1/ Number winters in freshwater
2/ Base year: assigned value of 100.0
3/ One index point = 3,012.32 smolts
4/ The previous 6-hour index for 1958-1962 has been revised to a 3-hour index catch by multiplying the percent of the 3-hour catch of the total 6-hour catch by the total 6-hour index catch
5/ Geometric mean

Source of Data

Fisheries Research Institute, University of Washington, 1956-1957

U. S. Bureau of Commercial Fisheries, 1958-1962

Alaska Department Fish and Game, Commercial Fisheries Division, Bristol Bay, 1963-1964

TABLE 51.--COMPARATIVE AGE, LENGTH AND INDEX NET CATCHES OF RED SALMON SMOLT FROM THE WOOD RIVER SYSTEM, 1951-1964*

Year of Seaward Migration	Age I[1]		Age II[1]		Index[3] Points	Index Net[4] Catch
	Percent	Mean Length in mm	Percent	Mean Length in mm		
1951	80.0	91.0	20.0	--	9.9	16,809
1952[2]	99.0	87.0	1.0	--	100.0	170,034
1953	95.3	86.0	4.7	103.0	296.1	503,444
1954	95.8	87.0	4.2	107.0	438.6	745,832
1955	98.0	85.0	2.0	102.0	221.7	377,032
1956	78.4	82.0	21.6	95.0	326.6[5]	559,932
1957	80.7	77.0	19.3	93.0	165.5[5]	244,831
1958	65.0	82.0	35.0	102.0	230.9[5]	423,580
1959	93.5	87.9	6.5	105.0	60.5[5]	100,450
1960	99.4	88.0	0.6	114.3	223.3	379,668
1961	93.0	81.7	7.0	102.1	518.7	881,911
1962	86.0	80.1	14.0	97.6	177.6	301,892
1963	84.3	82.6	15.7	102.1	88.9	151,206
1964	98.8	83.7	1.2	104.2	568.6	966,807
Average	89.1	84.4	10.9	102.3	173.4[6]	415,959

* Age and length weighted by index net catch
1/ Number winters in freshwater
2/ Base year: assigned value of 100.0
3/ One index point = 1,700.34 smolts
4/ Two hour index period, 9 p.m. to 11 p.m.
5/ Adjusted index
6/ Geometric mean

Source of Data
Fisheries Research Institute, University of Washington, 1951-1960
Alaska Department Fish and Game, Commercial Fisheries Division, Bristol Bay, 1961-1964